FACTS

Ministry of the Environment
Ontario

Hon. Jim Bradley
Minister

Rod McLeod
Deputy Minister

Publication Code: PFS2

ABOUT PESTICIDES

January 1980

PESTICIDE SAFETY IN YOUR HOME

Pesticides are substances which are used to kill or control a pest - an organism such as insect, plant, fungus, mite or rodent which is found in a place where it is not desired. Pests, especially insects, are a nuisance about the home when they invade food, causing waste or harbouring diseases. They may eat clothing, carpeting or furniture or they may bite pets or people. In these circumstances, pesticides may be the necessary tool to remove these pests.

In order to use pesticides to their best advantage, the home-owner must be well informed about their safe and correct handling and use. Observe the following precautions.

PURCHASING

Always carefully consider the pesticide you are purchasing. Check the label for the insect you wish to treat. In order to assure that the product is effective, the insect you wish to control should be listed on the label.

If the product you choose is a spray, note whether it is a surface or space spray. Surface sprays are applied to floor base-boards, shelving, etc., to leave an active residual quantity of pesticide to attack crawling insects. In contrast, space sprays are short-lived, more dilute pesticides which are sprayed into the air to attack flying insects.

Pesticides are sold at garden centres, hardware stores and exterminators' outlets. If you have a small problem to overcome, purchase a small quantity of pesticide. This avoids disposal or storage problems.

SAFE STORAGE

As soon as you arrive home with the pesticide, - whether it is mothballs, resin strips, weedkiller, or insecticide - find a secure place to store it, if possible a locked compartment.

Choose a place which is out of the reach of children or pets. Be sure it is away from food, medicine, housekeeping supplies or garden supplies (seeds, fertilizers) to avoid any possibility of accidental contamination. Also, check the label for any special precautions. If the pesticide is flammable, do not place near heat.

Keep the pesticide tightly closed, in its original labelled container. If an unlabelled container is discovered, discard it. Don't guess at the contents.

SAFE USE

Always read the label on the pesticide container everytime the pesticide is used. It is easy to forget an important caution or application method.

Never allow children to assist with a pesticide application. Be sure all pets and their feeding dishes are removed from the treatment area - this includes birds and their cages, aquaria, as well as dogs and cats.

If you are treating cupboards where food, dishes or utensils are stored, remove the food or dishes first. Do not allow pesticide to contaminate food or dishes. After the treatment, cover the shelving with foil or new shelf paper before replacing these goods.

When you are applying the pesticide, be careful. If you spill pesticide on your skin, immediately wash it off with soap and water. If you accidentally spill some pesticide, wipe it up with paper towelling or tissues and discard safely.

Work efficiently to limit the time of inhalation of the pesticide spray or dust. Never smoke while working with pesticides since pesticide may be carried to your mouth on the cigarette. As well, many pesticides are flammable.

If you must dilute the pesticide or mix it with a solvent, do not work in the kitchen sink or use eating utensils which could be accidentally placed back in service. Make up only enough pesticide for the present use. Avoid any chance of contamination. Mix outdoors or in a well ventilated area.

When you have completed the application of the pesticide, clean up. Wash your hands and face with soap and water. Remove clothing and launder separately from other family clothing before wearing again. If a residual pesticide has been applied, leave the premises for several hours to allow the residual to dry. Leave the windows open to allow the solvent of the pesticide to disperse. Occassionally, this solvent may be irritating.

If you have any pesticide left over which is not in the original container, check the label to see if you have another immediate use. If you have no other use, dispose of this diluted excess by digging a hole, eighteen inches deep, away from any water drainage area, then pour the excess in, carefully fill in the hole.

DISPOSAL OF EMPTY CONTAINERS

An empty pesticide container should never be used again. It may be disposed of safely by wrapping in newspaper or a plastic bag and placing in the garbage can. Cardboard containers, sacks, tins or bottles should be treated in the same manner. Never burn empty pesticide containers - the smoke or fumes produced may be toxic.

EMERGENCY!

After all safety precautions, suppose an accident occurs. You spill pesticide on yourself, then feel ill later; or someone accidentally swallows some pesticide. Immediately read the label on the pesticide container for first aid treatment.

With container in hand, immediately call your doctor or nearest Poison Control Centre. Read the details on the label to the doctor - name of product, active chemical ingredient, antidote - and ask the doctor what to do. If you go to the hospital, take the label with you.

For further information or assistance, contact your local representative of the Pesticides Control Section, Ministry of the Environment.

2nd Printing July 1982
3rd Printing Sept 1983
4th Printing Jan. 1985

FACTS

Ontario
Ministry of the Environment
Hon. Keith C. Norton, Minister
Graham W. S. Scott, Q.C., Deputy Minister

Publication Code:
WFS 3

ABOUT SEPTIC TANK SYSTEMS

(Reprint)
May 1981

Introduction

This fact sheet is produced for the convenience of the general public and should be distributed in conjunction with the application form for Certificate of Approval and the information sheet for installers. If this sheet does not answer all your questions or leaves a problem unresolved, you should then contact your nearest Municipal and Private Waste Abatement environmental officer at the Environment Ontario office in your district.

For definition purposes in relation to septic tank systems serving dwellings, sewage is defined as human and wash wastes.

Sewage Disposal

A correctly designed and constructed and maintained sewage disposal system will function effectively and safely, but a system which is badly designed and located or badly constructed or which is not adequately maintained thereafter, can lead to considerable nuisance and expense, and may seriously endanger health and the environment.

The Law and Sewage Disposal

Section 57 of the Environmental Protection Act is specific with respect to the approval which it is necessary to obtain for the construction of a private sewage disposal system or its alteration or enlargement. It applies to all property in Ontario and states:

"No person shall construct, install, enlarge, extend or alter,
(a) any building or structure in connection with which a sewage system will be used if the use of the building or structure so constructed, installed, established, enlarged, extended or altered will or is likely to affect the operation or effectiveness of the sewage system; or
(b) any sewage system,
unless a certificate of approval for the construction, installation, establishment, enlargement, extension, or alteration of the sewage system has first been issued by the Director."

In addition the Regulations prescribe the following for the operation and maintenance of all sewage systems:

- Except for the disposal of hauled sewage by means of irrigation, a sewage system or any part thereof shall not emit, discharge or deposit sewage onto the surface of the ground
- Sewage from a sewage system shall not emit, discharge, seep, leak or otherwise escape into a piped water supply, well water supply, a watercourse, ground water or surface water
- sewage in a sewage system or any part thereof shall not emit, discharge, seep, leak or otherwise escape from the sewage system or any part thereof other than from a place or part of the sewage system where the system is designed or intended to discharge sewage
- Insects and animal life shall be prevented from gaining access to sewage contained in a sewage system
- A sewage system or any part thereof shall not emit, discharge, deposit or allow the emission, discharge or deposit of micro organisms of intestinal origin into the natural environment in such a manner as may be a hazard to health
- No gas shall emit, discharge, or otherwise escape from the sewage system into any building or structure except in the manner in which the sewage system was designed or constructed to emit or discharge gas.

Aside from this legal requirement, it is in your best interest to get advice before you start to build, because the sewage disposal system may be the determining factor in establishing the location and ground elevation of your house or other building. Information concerning the Environmental Protection Act, 1971, or the Ministry's Regulations can be obtained from the local offices of the Ministry or the agency, normally the Health Unit, holding the delegated authority. Application forms and

general information can be obtained also from these sources.

Soil Assessment

The suitability of the soil for absorbing the liquid waste depends on such characteristics of the soil as its grain size and gradation, the presence of organic compounds, and its structure, density, moisture content, "plastic" properties and chemical composition. These characteristics must be assessed and a judgement made as to the percolative capacity of the soil for handling septic tank effluent.

In order to make this assessment an inspection must be made of the property, the result of the inspection and any soil testing undertaken being the selection of a percolation rate, "T" time, expressed in minutes, which is used in the accompanying tables.

Leaching Bed Design

Under normal conditions the ideal location for a leaching bed is in a well-drained, sandy loam soil, remote from any wells or surface water. For the leaching bed to work satisfactorily the maximum elevation of the ground water table, or of any rock formation or layer of impervious material shall be at least 3 feet below the elevation of the bottom of the absorption trenches.

Where water table is the limiting factor it is the highest water table that is of concern rather than the average or that found at the time of site investigation.

Gravity flow is permitted for leaching beds with up to 500 lineal feet of tile or perforated pipe. If required by topography a pump may be used to lift the effluent to a point where gravity flow will resume. Three-inch diameter perforated pipe may be used in beds up to 500 feet. If a pump or siphon is used for dosing a bed of this size, 4 inch diameter pipe is required. For leaching beds having more than 500 feet of distribution pipe the minimum diameter of tile or pipe is 4 inches and dosing of the bed by siphon or pump is mandatory.

The maximum length of any single absorption trench in a leaching bed is 60 feet for gravity fed beds and 100 feet for beds dosed by a siphon or pump.

The area of a leaching bed should generally be free of trees and bushes so that the bed is well aired and sunlight is able to reach the surface. Trees will only be permitted within the area of the bed if it is judged that no damage will occur from the roots considering the size and type of the tree and the arrangement of the tile or pipe runs.

A good growth of grass should be encouraged and maintained over the entire leaching bed area. The roots of grass and plants absorb liquid in the soil and transpire it to the atmosphere through the leaves. Sunlight should be allowed to reach the bed to promote evaporation. Traffic which can destroy the cover of vegetation and compact the soil above the bed should be avoided.

Beds on Sloping Sites

Leaching beds constructed in the conventional manner (Drawings 1 and 2) require sites that are level, or only slightly sloped. The economies and other problems of levelling the required area will generally limit conventional construction methods to slopes of not greater than 1 foot rise in each 10 feet horizontal distance (10%). Special methods of installation are required where more steeply sloped sites are encountered. Information on these may be obtained from Ministry or Health Unit offices and may be used in slopes from 10% up to 25% (1 foot raise in 4 feet horizontal). Leaching beds are not to be constructed on areas where the slope exceeds 25% in any direction.

Raised Leaching Beds

In cases where 3 feet of acceptable soil is not available under the pipe trenches and above high water table, rock or impervious soil, a solution may be found by constructing a leaching bed of selected material to form a mound in which the absorption trenches can be set so that the desired 3 foot clearance below the trenches is obtained. An impervious soil is one having a percolation rate "T" in excess of 60 minutes.

If a natural mantle is not present in an area, or is inadequate to ensure against breakout, sufficient permeable soil should be added to form a mantle for a distance of 50 feet down grade from the bed in the direction of trickle flow and its surface planted for stability and to promote evapotranspiration.

Clearance distances outlined in the following section must be increased by an amount equal to 2 feet horizontal for each 1 foot vertical height of the surface of the leaching bed above natural grade.

Tank and Tile Bed Location

In locating a septic tank system all clearances are to be measured horizontally.

A septic tank should not be closer than:

- 50 feet to any well, lake, river, stream, water course, pond, spring or reservoir
- 5 feet to any building or structure
- 10 feet to any property boundary.

The distribution pipe in a leaching bed shall not be closer than:

- 50 feet to a well which has a solid water-tight casing to 20 feet below ground
- 100 feet to a spring or well other than a well with a watertight casing to a depth of 20 feet.
- 25 feet to any building or structure where the bottom of the perforated or open jointed pipe or tile is equal in level with or above the level of the lowest floor
- 10 feet to any building or structure where the bottom of the perforated or open jointed pipe or the tile is below the level of the lowest floor
- 10 feet to any property boundary
- 50 feet to any lake, river, stream, water course, pond, spring or reservoir.

The above distances are minimum according to the regulation and may have to be increased to prevent pollution if soil or other site conditions so dictate.

TABLE NO. 1

LENGTH IN FEET OF DISTRIBUTION PIPE HOUSEHOLD SYSTEMS

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Number of Bedrooms	Where the percolation time is from 1 minute to 5 minutes inclusive	Where the percolation time is greater than 5 minutes but not greater than 10 minutes	Where the percolation time is greater than 10 minutes but not greater than 20 minutes	Where the percolation time is greater than 20 minutes but not greater than 30 minutes	Where the percolation time is greater than 30 minutes but not greater than 40 minutes	Where the percolation time is greater than 40 minutes but not greater than 50 minutes	Where the percolation time is greater than 50 minutes but not greater than 60 minutes
2 or less	150	150	180	220	250	300	350
3	150	200	300	350	400	450	500
4	180	250	350	450	500	550	650
5	220	300	430	530	610	680	750
6	260	360	520	630	730	820	890

Notes: 1. This table is for domestic systems only. It does not apply to schools, motels, hospitals or other such public or commercial premises.

2. The length of distribution pipe shown in this table must be increased by 20% if a garbage grinder is installed.

TABLE NO. 2

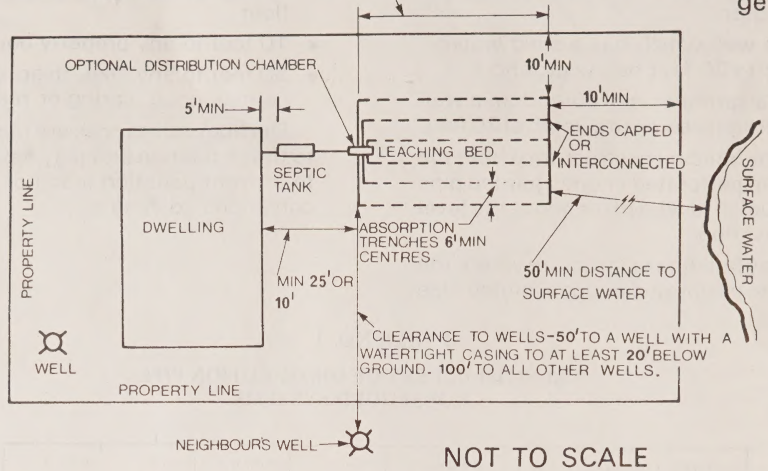
SEPTIC TANKS WORKING CAPACITY HOUSEHOLD SYSTEMS

Number of Bedrooms (2 persons per bedroom)	Minimum Total Working Capacity Litres *
2 or less	2700
3	3600
4	4500
5	4500

* 4.55 litres = 1 Imperial gallon

Drawing 1

septic tank systems general layout



NOT TO SCALE

TYPICAL ARRANGEMENT OF A SEPTIC TANK SYSTEM

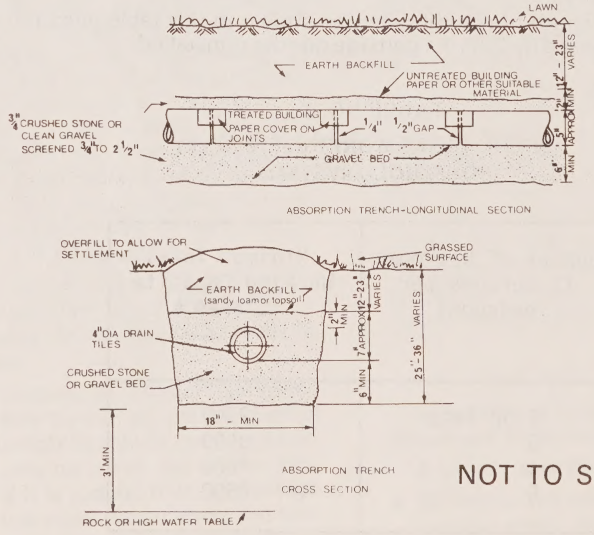
NOTES:

1. The above layout is suitable for a leaching bed using normal construction methods.
2. Location of tank and leaching bed to be on lower ground than adjacent wells or springs, if possible.
3. Internal plumbing and main drainage outlet should be designed with a view to connecting to possible future sanitary sewers.
4. Roof water, surface water, discharge from footing drains, etc. must be excluded from entry to septic tank.
5. Leaching beds NOT to be located in swampy ground or in ground liable to flooding.

Drawing 2

septic tank systems absorption trench details

NOTE:
Slope pipe between 4"-6" for trickle discharge and 3"-4" for pump or siphon discharge.



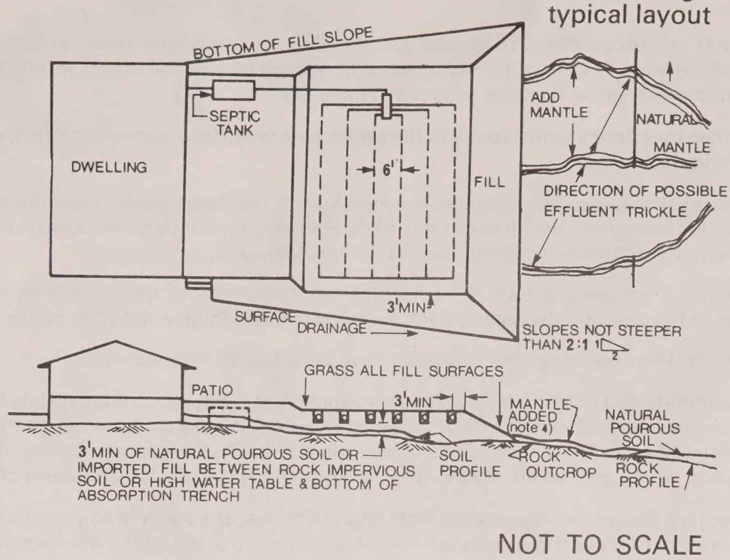
NOT TO SCALE

NOTE:

As alternative to the drain tiles shown use 3" perforated pipe in gravity fed leaching beds of up to 500 lineal feet of absorption trench and 4" perforated pipe in all leaching beds dosed by a siphon or pump.

Drawing 3

septic tank systems raised leaching bed typical layout



PLAN AND PROFILE - TYPICAL RAISED BED

NOTES:

1. Clearances from buildings, lot lines, wells, etc., as for normal leaching beds drawing No. 1 - plus 2 feet horizontal for each 1 foot vertical that surface of bed is above grade.
2. Fill slope must be stable for the material used, but not steeper than 2 feet horizontal to 1 foot vertical.
3. Percolation rate 'T' to suite imported material but not less than 5 mins. Select length of absorption trench from Table 1.
4. Effluent passing through fill must be absorbed into natural soil beneath the fill or into the surrounding permeable soil without ponding or breakout to surface. Where the natural soil cover is inadequate for this purpose for a distance of 50 feet from the bed in any direction in which effluent will trickle adequate fill must be added.
5. Details of absorption trench construction same as in drawing No. 2.

Additional information on septic tank installation can be obtained from the Municipal and Private Abatement environmental officer at the Ontario Ministry of the Environment office in your area, or the local Health Unit office.

LOCAL ENVIRONMENT ONTARIO OR HEALTH UNIT OFFICE ADDRESS & 'PHONE NO.

Care & Maintenance of a Septic Tank System

The septic tank and tile bed which has been installed should, with proper care and maintenance, provide many years of service. There are, however, some things which you, the homeowner should be aware of that will help the system to function properly. These are:

1. Do not allow roof drains to discharge to the septic tank or surface waters to drain towards the area of the leaching bed.
2. Water usage in the home should be kept to a minimum. If automatic washers and dishwashers are used make sure full loads are washed each time. Excessive use of water (such as doing numerous washings in one day) could flush solids from tank to the leaching bed.
3. Moderate use of household drain solvents, cleaners, disinfectants, etc., should not interfere with the operation of the sewage disposal system, however, indiscriminate use may cause problems.
4. There should be no need to use "starters", "bacterial feeds" or "cleaners".
5. If roots penetrate and plug the tile, two or three pounds of copper sulphate crystals flushed down the toilet once a year should kill the roots it contacts. However, the use of copper sulphate should be carefully supervised since it may corrode chrome, iron and brass. Cast iron is not significantly affected. The crystals, when used in the above manner, should not disrupt the operation of the septic tank.
6. The septic tank should be inspected at least once each year and the tank pumped out when necessary — every three or four years is suggested. Failure to pump-out a septic tank when required may result in sludge or scum being carried over to the leaching bed resulting in soil clogging and complete failure of the system.
7. Vehicular traffic (including snowmobiles) should not be allowed over the leaching bed.
8. The area over a leaching bed should have a good cover of grass but shrubs or trees should not be planted over the area. Good ventilation and adequate sunlight should be maintained in the area of the leaching bed.

IN THE INTEREST OF HEALTH AND THE PROTECTION OF THE ENVIRONMENT, ANY MALFUNCTION OF A SEPTIC TANK SHOULD BE PROMPTLY REPORTED TO THE LOCAL HEALTH UNIT OR MINISTRY OF ENVIRONMENT OFFICE.

Septic Tank Maintenance Record

Date	Nature of work [pumped out, general inspection, remedial work (specify)]	Name of company and person carrying out the work or inspection

FACTS

Ministry of the Environment
Ontario

Hon. Keith C. Norton, Minister
Graham W. S. Scott, Q.C., Deputy Minister

Publication code: Ed1

ENVIRONMENT ONTARIO'S EDUCATIONAL MATERIALS

(Reprint)
May, 1981

The Ontario Ministry of the Environment has available educational materials for teachers at both elementary and secondary school levels. The fact sheets and lesson plans are free of charge and may be duplicated by the teacher to provide class sets. Class sets of the other materials are available while supplies last. There is a charge for the manuals.

The following is currently available through the Ministry of Government Services Publication Centre. For ordering the following education materials please use the attached order form.

Please allow a minimum of eight weeks for delivery.

FACT SHEETS
(Single copies only)

FOR SECONDARY SCHOOL TEACHERS

TEd Set 1

- About Air Pollution
- Air Pollution and the Automobile
- Introduction to Water Pollution Control
- About Pesticides and the Environment
- About Waste: What Can One Family Do?

TEd Set 2

- Water Pollution - What Can I Do?
- A Visit to a Landfill Site
- Air Pollution - Particulates
- Constructing a Classroom Ecosystem
- An Anti-Pollution Club
- Education Study Project for High School Students
- Cafeteria Crisis
- The Present Tense of Soap

TEd Set 3

Ontario's Air Pollution Index
Resource Recovery
Odours
Noise Measurement - The Decibel
Planning a Pollution Slide Show/Seminar

TEd Set 4

Class Outings: Sunnyside Up/Down
Alternatives to Waste Disposal
Recycle and Save Our Resources
How to Publicize a Recycling Drive
Selecting a Landfill Site
Noise Studies

TEd Set 5

Air Pollution and Weather
Geography and the Community
Pollution in the Great Lakes
Investigating Environmental Habitats

TEd Set 6

Affects of Phosphates on Water
Affects of Smoke and Exhaust on Plant Growth
Assessment of Snowmobiles on Winter Environment
Chemical Properties of Air Pollutants

TEd Set 7

Acid Rain
Air Pollution and Plants
Examining Plant Damage
Developing Environmentally Aware Citizens

FOR ELEMENTARY SCHOOL TEACHERS

TEd Set 1E

Mini Posters for Coloring
Crossword Puzzle
Collage
Stories

TEd Set 2E

Introduction to Solid Waste and Recycling
Learning About Waste: Activities
Teaching About Air Pollution
Noise Studies
Comparing Plant and Animal Life in Water

TEd Set 3E

Clean-up Day
City Street Trees
City Planning
The School Site as a Teaching Resource

TEd Set 4E

Taking a Closer Look at Snow
Aquatic Habitat Study
Lawn Study
A Lesson Plan for Studying Soil

TEd Set 5E

Woodland Activity Book
The Terrarium
Solid Waste
Techniques of the Blind Walk
Organizing the Middle Junior High Laboratory Classroom

TEd Set 6E

Acid Rain
Air Pollution and Plants
Soil Erosion
The Wonders of Ice

TEd Set 7E

Water Treatment Plant
Exploring the Outdoor With Young People
Window Field Trip (K-3)
The City Ecosystem

AIDS FOR STUDENTS
(Class sets (35) available)

Ed 2 Envirofacts and fun - a tabloid on pollution for elementary school students
Ed 3 Ontario's Environment Today - a tabloid on Environmental issues for high school students
Ed 4 Solutions to Pollution with the Anti-Pollutes of Donber Creek - a coloring book and story about Fran the Toad for young children
Ed 5 The Glut - a game book for children on thoughtless polluters
Ed 6 My Water Book - a children's book (K-6) on the world of water

MANUALS

The following are available ONLY from the Publication Centre, Ontario Government Bookstore, 880 Bay Street, Toronto, Ontario, M7A 1N8. Please make cheques payable to the Treasurer of Ontario.

Ed 7 Environmental Studies for ... l Education Teachers
- environmental l... ans for teachers working with hand... children. 167 pages. $2.

DISCONTINUED

Ed 8 From the Lakes.....to the Trees
An Environmental Handbook for Camp Leaders
- includes field studies, identification guides, games, arts and crafts, poetry and songs. 113 pages. $1.

Ed 12 Introducing Your Child to Nature
Prepared in recognition of the International Year of the Child
- this environmental manual is designed and written for parents interested in experiencing outdoor environmental education with their children - includes field studies, arts and crafts, games and identification guides. 156 pages. $2.

Ed 16 Exploring the Environment With the Handicapped
Produced in co-operation with the Boy Scouts of Canada
- this manual covers multiple aspects of introducing and adapting the handicapped to environmental studies. 264 pages. $3.

ADDITIONAL FACT SHEETS FOR TEACHERS
(Single copies only)

Ed 9 A Lesson Plan for Measuring Some Water Quality Criteria
Ed 10 A Lesson Plan for a Land-Use Simulation Game
Ed 11 A Lesson Plan for Investigating An Urban Environment

POSTERS (For Coloring)
(Class sets (35) available)

Edp 3	Ogg Posters - Air
Edp 4	" " - Water
Edp 5	" " - Waste
Edp 6	" " - Noise
Edp 7	" " - Auto Emissions
Edp 8	" " - Pesticides

HANDBOOKS

Each unit incorporates fact sheets on various aspects of the title subject and is suggested for use by multiple audiences - teachers, students, citizen groups, civic organizations, etc. - interested in the broad spectrum of:

Ed 13	Waste Management and Recycling.	44 pages
Ed 14	Water Quality and its Protection.	88 pages
Ed 15	Air Quality and its Protection.	77 pages

SLIDE SHOWS

Audio-visual presentations may be borrowed from the Ministry on a three-week loan period. When requesting, please give six weeks advance notice and alternate dates for viewing, if possible.

Join The Waste Watchers
- includes 65 slides, tape cassette and script.
- describes the various methods of waste disposal with emphasis on resource recovery. Also calls for consumer action.

Controlling Noise in Ontario
- includes 80 slides, tape cassette and script.
- discusses noise problems, government action and the new model bylaw.

Children and Nature
- 80 slides, tape cassette and script.
- a project for the "Year of the Child", the show relates to outdoor education and the environment.

Getting out of the Dumps
- a slide/sound show directed towards municipalities, explaining the advantages of two or more municipalities pooling resources for a joint landfill site. 7 minutes, color.

FILMS

For reservations:

Films are not circulated by the Ministry, but may be borrowed by writing to the addresses below. It is recommended that at least three weeks prior notice be given, and if possible, alternate dates.

The following films are available from:

Modern Talking Picture Services
143 Sparks Avenue
Willowdale, Ontario
M2H 2S5
Phone: (416) 498-7293

PROJECT ENVIRONMENT

This film provides a look at the pollution problems in this Province, some of the solutions, and the role of the Ministry of the Environment and its staff in managing the environment in Ontario. This is recommended as a 'first choice' for those interested in an overview of the environmental problems in the Province.
15 minutes, color.

WOMEN IN THE ENVIRONMENT

To commemorate International Women's Year, the Ministry of the Environment embarked upon a project to serve as a tribute to the many women employed in the environmental field...a film. The result is more than a catalogue of jobs. It is a film containing a mass of important, up-to-date, environmental information. The film should be of particular value to biology and geography teachers of senior secondary school students as well as to guidance counsellors.

THE INVISIBLE RIVER

Produced by the Ministry of the Environment for a general audience, this film holds special appeal for young people. The construction of a water supply system to carry water from the Great Lakes to an inland community is compared to building a children's sand castle on a beach.
19 minutes, color.

RIVER UNDER GROUND

A documentary for the Ontario Ministry of the Environment by four student film-makers on the building of the Ministry's largest sewage service system shows how environmental and social responsibility apply to major construction works. This film is a must for those interested in environmental planning and development.
21 minutes, color.

A MATTER OF COMMON SENSE

Garbage begins in the home. One family's approach to controlling and recycling waste is related to the broad environmental issue. Produced by the Ministry for general audiences.
13.5 minutes, color.

LAKE ODYSSEY

This film, produced by the Ontario Ministry of the Environment, dramatizes the restoration of the Kawartha Lakes resort area by an extensive water management program and the potential for recycling the harvest of aquatic vegetation.
27 minutes, color.

The following audio/visual aids are available from:

Association Films
333 Adelaide Street West
Toronto, Ontario
M5V 1R6
Phone: (416) 362-2501

FILM

EXPLORING OUR ENVIRONMENT

This film describes the experiences and lessons learned by the instructor and audience during the Ministry's summer "Environmental Explorations" program. The latter is geared to visit schools, provincial parks and private camps during the months of June, July and August each summer. A variety of outdoor environmental education experiences are offered.
13 minutes, color

SLIDE SHOW

WE ARE ENVIRONMENT ONTARIO

This slide-sound presentation looks at the role of the Ministry of the Environment and its staff in managing the environment in Ontario.
10 minutes, color. Available in English and French.

VIDEOCASSETTE

THE CASE AGAINST THE RAIN

Acid rain is one of the greatest environmental challenges facing scientists and governments throughout eastern North America and Europe today. What does this mean to Ontario?

In April 1980, an 18-minute documentary presentation of "The Case Against the Rain" was completed on videocassette. The program defines the technical causes and effects of acid rain, outlines the economic implications and explores the Ministry's ongoing research effort.

"The Case Against the Rain" is available on 3/4" or 1/2" videocassette for public information programing and educational use. A french language version of the documentary, "Le proces de la pluie", is also available.

ORDER FORM

Educational Materials

The Ontario Ministry of the Environment makes available a variety of educational fact sheets dealing with environmental issues. The notes, which are free-of-charge, are designed for teacher use and offer a number of teaching suggestions. Only one set of this material is available to a classroom but teachers may duplicate anything of interest.

If you would like to order the fact sheets or receive any of the other units in class sets (35), please fill in the following form and return it to:

Publications Centre
Ministry of Government Services
880 Bay Street, 5th floor
Toronto, Ontario
M7A 1N8

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please print

Name --

School --

School Address --

Postal Code ---

Publications Requested - by Code #:

FACTS

Ministry of the Environment
Ontario
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

ABOUT SEWAGE TREATMENT October 1982

THE PROCESS AND HOW THEY WORK

Introduction

There are many types of wastewater treatment processes for sanitary wastes but the major treatment methods are variations of the principles which nature uses to purify a river or other body of water. Basically the more essential factors such as sedimentation and the biological breakdown of wastes are speeded up in the treatment plant, with the end result being a quality product which places a minimum amount of strain on the environment. Recently, a chemical method of treatment to reduce the phosphorus content of the effluent has been adapted to the various treatment types and this is seen to be a key factor in controlling nuisance algae in a watercourse.

At present, three basic stages or major treatment methods, are employed in Ontario and these may be categorized as "primary", "secondary" and "tertiary" treatment. In the primary stage, solids are allowed to settle and are removed as sludge from the water. The secondary stage uses biological processes to purify the wastewater even further. Tertiary processes are now being installed at specified locations to meet more stringent receiving water quality requirements.

It is important to note that over 78%, of Ontario's sewered wastewaters now receive secondary treatment or better.

The efficiency of all treatment whether primary, secondary or tertiary are generally rated in terms of the percentage removal of Biochemical Oxygen Demand (BOD) and the percentage removal of Suspended Solids (SS). BOD is simply the amount of oxygen uptake by bacteria to decompose the wastes and SS are the organic and inorganic substances suspended in the wastewater.

1. Primary Treatment

Wastes entering a plant for treatment, normally pass through a screen to remove certain items such as rags or sticks etc. which may clog pumps or pipes. After screening, the wastes are directed into a grit chamber where sand, small stones etc., are allowed to settle. With the grit removed, the mechanics of settling are further employed to remove the inorganic matter and suspended solids in a primary sedimentation tank or clarifier. The material (sludge) which has finally settled is removed to a digester or other treatment facility where it is suitably stabilized prior to final disposal. Primary treatment generally removes 40 to 60 percent of the suspended solids and in so doing it achieves 30 to 50 percent reduction of BOD. To complete primary treatment, the effluent from the clarifier is usually chlorinated before being discharged to a receiving stream, river or lake. Chlorination reduces the number of disease causing bacteria. The effluent produced from primary treatment is of a lower standard of quality than is achieved in secondary treatment; consequently, this form of treatment is used only when it will meet the water quality requirements of the receiving body of water.

2. Secondary Treatment

The secondary stage of treatment removes up to 90% of the BOD through the action of bacteria and is commonly referred to as biological treatment. The term biological refers to the micro-organisms present in the waste water and these are utilized to break down the organic matter with the end result being a settleable material (sludge), which may be removed, and a clear liquid effluent.

There are various forms of secondary treatment but the "activated sludge process" is by far the most popular method used today. Other forms of secondary treatment such as lagoons and trickling filters are also being used in Ontario but to a lesser extent.

2.1 Activated Sludge Process

The activated sludge process reduces the organic content of the wastes in as short a time as possible by efficiently maintaining the biological activity on the incoming wastes. This is done by introducing a highly developed bacterial community, "activated sludge", to the new wastes as soon as possible, usually at the agitation and aeration sections. The efficiency of this process is ensured by providing a suitable environment for the micro-organisms, which means, supplying optimum amounts of food in the form of wastes, oxygen through aeration and a temperature high enough to maintain the desired growth of the microbes.

The following treatment types, are modifications of the activated sludge process.

a) Conventional Secondary

In this process, the effluent from the primary treatment stage is conveyed to an aeration section where it is thoroughly mixed by the introduction of air for approximately 6 to 8 hours. The air provides sufficient oxygen and contact through agitation with the new wastes to ensure that an efficient decomposition of the wastes occurs. An optimum balance between the incoming food, (primary effluent) and the population of the mixed biological community is maintained by adding a portion of the activated sludge to the beginning of the aeration section. Excess activated sludge together with some liquids are directed to the digesters where they receive further treatment. A clear high quality effluent is produced and the removal of BOD and suspended solids ranges from 90 to 95 percent.

b) High Rate

The high rate modification was developed by overloading the conventionally designed activated sludge plants. The organic load in the aeration sections is the highest of any of the other variations of the activated sludge process and the aeration time is proportionately shorter (1 to 3 hours). Excess activated sludge and some liquids are placed in a digester where they are stablized before final disposal. A higher volume of wastes may be handled in a shorter period of time, which makes for a more economical operation. A primary treatment section may or may not be present, and this method is generally used where industrial wastes are encountered.

The high rate type of treatment is reported to have a removal rate for BOD and suspended solids in the 80 to 85 percent range.

c) Extended Aeration

The incoming wastes are immediately placed in an aeration section without primary settling and a longer aeration time is employed usually 18 to 24 hours. Due to the long aeration period a more complete decomposition or oxidation of the wastes occurs.

As with the conventional secondary, a high level of biological activity is maintained throughout the aeration tank by returning some of the activated sludge to the raw sewage influent. Excess activated sludge together with some liquids are placed in a holding tank or sometimes a digester prior to final disposal. The reduction in BOD is usually in excess of 90%.

d) Contact Stabilization

This modification provides a means of varying the contact time between the incoming wastes and the activated sludge. The initial operation is done in a small chamber called a contact aeration tank and usually lasts for 1 or 2 hours. After this short aeration period the wastes undergo settling and the resulting sludge is re-aerated for a further 2 to 6 hours. The total aeration times of the sludge ranges from 3 to 8 hours which allows for the production of the activated sludge required in the contact aeration tank. Excess activated sludge together with some liquids are placed in a holding tank or sometimes a digester prior to final disposal.

The removal of suspended solids and BOD is similar to the conventional secondary method.

e) Oxidation Ditch

An oxidation ditch is a retention channel constructed in the shape of a race track which is equipped with a rotary aerating device, which circulates the wastewater around the channel where the activated sludge process is employed. After the required retention time the treated wastewater is drawn off as new wastes are added, and placed in a settling tank where the sludge is collected and then either returned to the ditch or removed for final disposal. The effluent from the settling tank is clear and of good quality. The removal of BOD and suspended solids ranges from 85 to 90 percent. This process is similar to extended aeration and is usually used in smaller communities.

2.2 Lagoons, Aerated Cell and Aerated Lagoon

A lagoon is a flat bottomed structure composed of earth dikes and sized to retain the wastewater for a designated period of time. The lagoon employs many complex systems working together in a cyclical manner. For example, the bacteria converts the organic matter into available plant food and promotes the growth of algae, which is one of the simplest forms of plant life. The algae, with the aid of sunlight, produces oxygen which is required to maintain good bacterial activity on the incoming wastes. Also, the bacteria, with sufficient food (wastes), grow and give off carbon dioxide, which is needed to sustain the algae's life cycle. During the retention period these natural processes work together to decompose and effectively stablize the wastes. The efficiency of these processes are dependent on several factors such as liquid depth, temperature, algae growth, waste characteristics, etc. When conditions are at an optimum, then a good quality effluent may be expected.

Some lagoons, or waste stabilization ponds may be aerated, by either mechanical stirring or the bubbling of air into one small cell (aerated cell) or throughout the entire lagoon (aerated lagoon). Aeration reduces the retention period, increases the capacity of the existing lagoon and is useful in treating some industrial wastes. 80 to 85 percent removal of BOD and suspended solids may be expected.

2.3 Trickling Filter

The trickling filter is simply a bed of stones from 3 to 6 feet deep to which primary treated sewage is equally distributed. Bacteria adhere to and multiply on the surfaces of these stones until they can consume most of the organic matter. Treated water trickles out through a network of pipes in the bottom of the filter where it is collected and directed to a final clarifier before final disposal. BOD and suspended solids removal by this process has been reported from 75 to 90 percent. Trickling filters have generally been employed in the more temperate climates.

3. Tertiary Treatment

Tertiary treatment processes are applied to secondary effluent to further upgrade the effluent quality for specific receiving water needs.

In Ontario, the only tertiary processes being used on a municipal scale are polishing lagoons and tertiary effluent filtration. These are designated as "effluent polishing" in this publication.

a) Polishing Lagoons

Polishing lagoons offer an opportunity for increased BOD and suspended solids removal at a minimum of cost but require a relatively large land area. Secondary effluent is passed into lagoon where it is retained for several days while the algae-bacterial symbiotic relationship is encouraged to optimize oxidation of the organic waste. A fairly consistent removal of BOD is maintained throughout the year. There is a marked increase in effluent suspended solids during the summer months when algal activity is at its peak and this constitutes a major disadvantage of the polishing lagoon. BOD removals in the order of 40 to 60% from a secondary effluent may be achieved.

b) Effluent Filtration

Filtration of secondary effluent is the most widely applied tertiary process in Ontario. A well designed and operated tertiary filter should achieve a good lowering of suspended solids and is effective in reducing BOD and total phosphorus.

4. Phosphorus Removal

Treatment for phosphorus basically consists of the addition of a chemical which through precipitation lowers the phosphorus in the effluent to a specified amount. Phosphorus must be reduced to one part per million (1 ppm) or milligram per litre (mg/l) in all designated plants in the Lower Great Lakes drainage basin. Designated plants in the Upper Great Lakes and Ottawa River drainage basins must reduce influent phosphorus by 80 percent or to 1 ppm. Phosphorus removal facilities can be incorporated into any existing treatment works and the chemicals generally used are lime, aluminium salts or iron salts. New chemicals to be used in any plant must first undergo treatability studies to determine if the desired reduction of phosphorus is achieved with no upset in plant operation and to ensure that the quality of effluent has not suffered any deterioration.

Important side benefits of increased removal of organic material and suspended solids occur when phosphorus treatment is employed in primary plants and lagoons with seasonal discharge. Secondary plants and continuous discharge lagoons do not enjoy these benefits; however, secondary plants report better settling in the final stages.

FAITS

Ministère de l'Environnement
Ontario
l'hon. Keith C. Norton, c.r., Ministre
Gérard J. M. Raymond Sous-ministre

LE TRAITEMENT DES EAUX USÉES — Octobre 1982

QUELQUES MOTS SUR DIFFÉRENTS PROCÉDÉS

INTRODUCTION

Il existe de nombreux procédés d'épuration des eaux d'égout. Les plus courants exploitent les principes de la purification naturelle des rivières et des masses d'eau. Fondamentalement, ils consistent à accélérer, dans une usine d'épuration, les phénomènes de sédimentation et de dégradation biologique des matières pour obtenir, à la sortie, une eau de qualité suffisante pour affecter au minimum l'environnement. Récemment, une méthode chimique, destinée à réduire la teneur en phosphore dans les eaux rejetées, a été adaptée aux différentes méthodes d'épuration et constitue à présent un élément clé dans la lutte contre l'envahissement des cours d'eau par les algues.

À l'heure actuelle, en Ontario, les eaux usées peuvent être soumises à trois stades ou méthodes d'épuration: épuration "primaire", épuration "secondaire" et épuration "tertiaire". Au stade primaire, on laisse les matières sédimenter et elles sont enlevées sous forme de boues. Au stade secondaire, on a recours à des procédés biologiques pour accroître encore la qualité de l'eau. Des installations d'épuration tertiaire sont maintenant en cours de construction en plusieurs endroits, pour respecter des normes plus strictes de qualité de l'eau.

Il convient de noter que plus de 78% des eaux usées d'égout de l'Ontario sont maintenant épurées au moins jusqu'au stade secondaire.

L'efficacité de toutes ces méthodes, qu'elles soient primaires, secondaires ou tertiaires, est évaluée en général par la réduction de la "demande biochimique en oxygène" (DBO) et des "particules en suspension" (PS). La DBO est simplement la quantité d'oxygène de l'eau utilisée par les bactéries pour décomposer les matières organiques, tandis que les PS représentent les matières organiques et inorganiques en suspension dans l'eau.

1. ÉPURATION PRIMAIRE

Les eaux pénétrant dans une usine d'épuration traversent normalement une grille destinée à arrêter les gros objets comme les chiffons ou les morceaux de bois, qui risqueraient d'obstruer les pompes et les canalisations. Après "dégrillage", l'eau est envoyée dans un bassin de dessablage, où le sable, les grosses particules, etc. se déposent. Après le dessablage, on laisse l'eau se décanter, pour enlever les matières inorganiques en suspension, dans un bassin de sédimentation primaire ou décanteur. Les boues déposées sont alors envoyées dans un digesteur, ou dans d'autres installations de traitement, où elles sont convenablement stabilisées avant d'être évacuées. L'épuration primaire permet en général d'enlever de 40 à 60% des particules en suspension et, par ce

biais, d'obtenir une réduction de 30 à 50% de la DBO. Pour compléter l'épuration primaire, l'eau sortant du décanteur est généralement chlorée avant d'être déversée dans le cours d'eau, la rivière ou le lac. La chloration réduit le nombre des bactéries pathogènes. Après épuration primaire, la qualité de l'eau est inférieure à ce qu'elle serait après épuration secondaire. L'épuration primaire n'est donc utilisée seule que si l'eau résultante est conforme à la norme de qualité fixée pour les eaux réceptrices.

2. ÉPURATION SECONDAIRE

Ce deuxième stade de l'épuration réduit la DBO de 90% grâce à l'action de bactéries. On l'appelle plus communément "épuration biologique". Le mot biologique se réfère aux micro-organismes présents dans les eaux usées, qui décomposent la matière organique en matière décantable (boues), que l'on peut enlever, et qui laissent une eau claire.

Il existe diverses méthodes d'épuration secondaire, mais la plus utilisée, et de loin, à l'heure actuelle est le "procédé des boues activées". D'autres méthodes d'épuration secondaire, comme le bassin de stabilisation et le lit bactérien, sont également utilisées en Ontario, mais à un degré moindre.

2.1 PROCÉDÉ DES BOUES ACTIVÉES

Le procédé des boues activées réduit la teneur des eaux usées en matière organique dans un temps aussi court que possible en entretenant l'activté biologique dans l'eau. Pour cela, on ensemence l'eau brute avec une communauté bactérienne très développée, "les boues activées", habituellement au niveau des installatins d'agitation et d'aération. On fournit aux micro-organismes un milieu qui est favorable à leur multiplication: les éléments nutritifs nécessaires, constitués par la matière organique de l'eau à épurer, l'oxygène, par aération, et une température convenable.

Les méthodes d'épuration ci-après constituent des variantes du procédé des boues activées.

a) Épuration secondaire traditionnelle:

Selon cette méthode, l'eau sortant du décanteur primaire est envoyée dans un bassin d'aération où elle est brassée par l'injection d'air pendant environ 6 à 8 heures. L'air fournit l'oxygène et des contacts suffisants par agitation pour permettre la décomposition efficace de la matière organique. On maintient un équilibre optimal entre éléments nutritifs (eau du décanteur primaire) et la communauté biologique en ramenant une partie des boues activées à l'entrée du bassin d'aération. L'excès de boues activées ainsi que des liquides sont envoyés vers les digesteurs. L'eau sortant du bassin d'aération est une eau claire, de bonne qualité, dont 90 à 95% de la DBO et des particules en suspension ont été éliminées.

b) Forte charge

Le procédé à forte charge est le résultat de la surcharge des stations à boues activées de conception traditionnelle. La charge organique dans les installations d'aération est la plus élevée de toutes les variantes du procédé des boues activées et la durée d'aération est proportionnellement plus courte (1 à 3 heures). L'excès de boues activées ainsi que des liquides sont envoyés dans un digesteur où ils sont stabilisés avant d'être évacués. Cette méthode permet ainsi de traiter un volume plus important d'eaux usées en un temps plus court et de rentabiliser l'exploitation. La station peut aussi comporter des installations d'épuration primaire. Cette méthode est généralement utilisée pour épurer les eaux industrielles.

Ce type d'épuration à forte charge permet d'éliminer de 80 à 85% de la DBO et des particules en suspension.

c) Aération prolongée

Les eaux usées sont immédiatement envoyées dans un bassin d'aération, sans décantation primaire, et sont aérées plus longtemps, habituellement de 18 à 24 heures. En raison de la longue aération, la matière organique est décomposée ou oxydée de manière plus complète.

Comme dans le cas de l'épuration secondaire traditionnelle, on maintient une activité biologique importante dans tout le bassin d'aération en renvoyant une partie des boues activées à l'entrée du bassin. L'excès de boues activées et des liquides sont envoyés dans un réservoir ou, parfois, dans un digesteur, avant d'être évacués. La DBO est habituellement éliminée à plus de 90%.

d) Stabilisation par contact

Cette variante du procédé permet de modifier la durée du contact entre les eaux brutes et les boues activées. L'aération initiale se fait dans un petit bassin, le bassin d'aération par contact, et dure habituellement 1 à 2 heures. Après cette courte aération, on laisse les eaux se décanter et les boues obtenues sont réaérées pendant 2 à 6 heures de plus. La durée totale d'aération des boues est comprise entre 3 et 8 heures, ce qui permet d'obtenir les boues activées nécessaires au bassin d'aération par contact. L'excès de boues activées ainsi que des liquides sont envoyés dans un réservoir, ou, parfois, dans un digesteur, avant d'être évacués.

Le degré d'élimination des particules en suspension et de la DBO est analogue à celui obtenu par la méthode secondaire traditionnelle.

e) Fossé d'oxydation

Un fossé d'oxydation est un canal de rétention en anneau équipé d'un dispositif d'aération qui fait circuler l'eau. On y utilise le procédé des boues activées. Au bout du temps de rétention requis, l'eau épurée est soutirée (et remplacée par de l'eau brute) et envoyée dans un bassin

de décantation où les boues sont recueillies et sont, soit renvoyées dans le canal, soit évacuées. L'eau sortant du bassin de décantation est claire et de bonne qualité. La DBO et les particules en suspension sont éliminées de 85 à 90%. Ce procédé est analogue à une aération prolongée et est habituellement utilisé dans les petites localités.

2.2 BASSIN DE STABILISATION, CELLULE AÉRÉE OU BASSIN AÉRÉ

Un bassin de stabilisation est un bassin à fond plat, délimité par des levées de terre et dont les dimensions permettent la rétention des eaux usées pendant une durée fixée. Ce bassin exploite une combinaison de phénomènes complexes fonctionnant de manière cyclique. Par exemple, les bactéries transforment la matière organique en éléments nutritifs utilisables par la végétation et favorisent la croissance des algues, l'une des plus simples formes de vie végétale. Les algues, avec l'aide du soleil, produisent l'oxygène requis pour maintenir une bonne activité bactérienne dans l'eau. En outre, les bactéries, qui disposent d'éléments nutritifs en quantité suffisante (les eaux usées) se multiplient et produisent le gaz carbonique nécessaire au cycle biologique des algues. Pendant la période de rétention, ces phénomènes naturels se combinent pour décomposer et stabiliser la matière organique. Leur efficacité dépend de plusieurs facteurs comme la profondeur de l'eau, la température, la croissance des algues, les matières présentes dans l'eau, etc. Lorsque les conditions sont optimales, on obtient une eau de bonne qualité.

Certains bassins de stabilisation peuvent être aérés, soit par malaxage mécanique, soit par injection d'air dans une petite cellule (cellule aérée) ou sur toute l'étendue du bassin (bassin aéré). L'aération réduit la durée de rétention, augmente la capacité d'épuration du bassin et favorise l'épuration de certaines eaux industrielles. Ces procédés permettent d'éliminer 80 à 85% de la DBO des particules en suspension.

2.3 LIT BACTÉRIEN

Le lit bactérien est simplement un lit de pierres de 3 à 6 pieds d'épaisseur sur lequel l'eau venant d'un décanteur primaire est répartie uniformément. Des bactéries adhèrent à la surface de ces pierres et s'y multiplient jusqu'à ce qu'elles aient consommé l'essentiel de la matière organique. L'eau épurée traverse le lit jusqu'à un réseau de tuyaux placés dans le fond du filtre, où elle est recueillie et envoyée vers un décanteur avant d'être évacuée. On élimine ainsi de 75 à 90% de la DBO et des particules en suspension. Les lits bactériens sont généralement utilisés dans les régions au climat plus tempéré.

3. ÉPURATION TERTIAIRE

Les procédés d'épuration tertiaire sont destinés à améliorer la qualité des eaux sortant d'installations d'épuration secondaire, au niveau fixé pour les eaux réceptrices.

En Ontario, les seuls procédés tertiaires utilisés à l'échelle municipale sont les bassins de polissage et la filtration tertiaire. C'est ce que l'on appelle "traitement de polissage" dans cette publication.

a) Bassins de polissage

Les bassins de polissage permettent d'éliminer une plus grande proportion de la DBO et des particules en suspension à un coût minimal. Ils requièrent cependant des superficies assez importantes. L'eau épurée est envoyée dans le bassin où elle reste plusieurs jours pendant que les phénomènes symbiotiques algues-bactéries sont favorisés pour optimiser l'oxydation de la matière organique. On obtient une élimination assez constante de la DBO sur toute l'année, mais les particules en suspension augmentent de façon marquée pendant les mois d'été, alors que l'activité des algues est à son maximum. C'est un inconvénient majeur du bassin de polissage. La DBO est réduite de 40 à 60% entre l'entrée et la sortie.

b) Filtration

La filtration des eaux sortant d'installations d'épuration secondaire est la méthode tertiaire la plus largement utilisée en Ontario. Un filtre tertiaire bien conçu et convenablement utilisé permet d'enlever efficacement les particules en suspension et de réduire la DBO et le phosphore total.

4. ÉLIMINATION DU PHOSPHORE

Le traitement de l'eau pour en éliminer le phosphore consiste essentiellement à ajouter une substance chimique pour ramener, par précipitation, la concentration de phosphore dans l'eau à une valeur spécifiée. La concentration de phosphore doit être abaissée à une partie par million (1 ppm) ou un milligramme par litre (mg/l) à la sortie de toutes les installations d'épuration se trouvant dans le bassin versant des Grands Lacs inférieurs. Certaines installations du bassin versant des Grands Lacs supérieurs et de la rivière des Outaouais doivent réduire de 80% la concentration de phosphore dans l'eau rejetée ou la ramener à 1 ppm. Les installations d'élimination du phosphore peuvent être incorporées à toute usine d'épuration des eaux. Les produits chimiques généralement utilisés sont la chaux, les sels d'aluminium et les sels de fer. Avant d'introduire de nouveaux produits chimiques dans des installations d'épuration, il faut procéder à des études pour déterminer si la réduction de la concentration de phosphore est obtenue sans perturber le fonctionnement des installations et pour s'assurer que la qualité de l'eau rejetée n'est diminuée d'aucune manière.

Le traitement d'élimination du phosphore comporte des avantages importants du point de vue de l'élimination des matières organiques et inorganiques en suspension dans les installations primaires et dans les bassins de stabilisation à évacuation saisonnière. Les installations secondaires et les bassins à évacuation continue ne bénéficient pas des mêmes avantages. Toutefois, on signale une meilleure décantation aux stades finals dans le cas des installations secondaires.

FACTS

Ontario
Ministry of the Environment
Hon. Keith C. Norton, Q.C., Minister
Gérard J. M. Raymond, Deputy Minister

ABOUT SEWAGE TREATMENT — October 1982

THE PROCESS AND HOW THEY WORK

Introduction

There are many types of wastewater treatment processes for sanitary wastes but the major treatment methods are variations of the principles which nature uses to purify a river or other body of water. Basically the more essential factors such as sedimentation and the biological breakdown of wastes are speeded up in the treatment plant, with the end result being a quality product which places a minimum amount of strain on the environment. Recently, a chemical method of treatment to reduce the phosphorus content of the effluent has been adapted to the various treatment types and this is seen to be a key factor in controlling nuisance algae in a watercourse.

At present, three basic stages or major treatment methods, are employed in Ontario and these may be categorized as "primary", "secondary" and "tertiary" treatment. In the primary stage, solids are allowed to settle and are removed as sludge from the water. The secondary stage uses biological processes to purify the wastewater even further. Tertiary processes are now being installed at specified locations to meet more stringent receiving water quality requirements.

It is important to note that over 78%, of Ontario's sewered wastewaters now receive secondary treatment or better.

The efficiency of all treatment whether primary, secondary or tertiary are generally rated in terms of the percentage removal of Biochemical Oxygen Demand (BOD) and the percentage removal of Suspended Solids (SS). BOD is simply the amount of oxygen uptake by bacteria to decompose the wastes and SS are the organic and inorganic substances suspended in the wastewater.

1. Primary Treatment

Wastes entering a plant for treatment, normally pass through a screen to remove certain items such as rags or sticks etc. which may clog pumps or pipes. After screening, the wastes are directed into a grit chamber where sand, small stones etc., are allowed to settle. With the grit removed, the mechanics of settling are further employed to remove the inorganic matter and suspended solids in a primary sedimentation tank or clarifier. The material (sludge) which has finally settled is removed to a digester or other treatment facility where it is suitably stabilized prior to final disposal. Primary treatment generally removes 40 to 60 percent of the suspended solids and in so doing it achieves 30 to 50 percent reduction of BOD. To complete primary treatment, the effluent from the clarifier is usually chlorinated before being discharged to a receiving stream, river or lake. Chlorination reduces the number of disease causing bacteria. The effluent produced from primary treatment is of a lower standard of quality than is achieved in secondary treatment; consequently, this form of treatment is used only when it will meet the water quality requirements of the receiving body of water.

2. Secondary Treatment

The secondary stage of treatment removes up to 90% of the BOD through the action of bacteria and is commonly referred to as biological treatment. The term biological refers to the micro-organisms present in the waste water and these are utilized to break down the organic matter with the end result being a settleable material (sludge), which may be removed, and a clear liquid effluent.

There are various forms of secondary treatment but the "activated sludge process" is by far the most popular method used today. Other forms of secondary treatment such as lagoons and trickling filters are also being used in Ontario but to a lesser extent.

2.1 Activated Sludge Process

The activated sludge process reduces the organic content of the wastes in as short a time as possible by efficiently maintaining the biological activity on the incoming wastes. This is done by introducing a highly developed bacterial community, "activated sludge", to the new wastes as soon as possible, usually at the agitation and aeration sections. The efficiency of this process is ensured by providing a suitable environment for the micro-organisms, which means, supplying optimum amounts of food in the form of wastes, oxygen through aeration and a temperature high enough to maintain the desired growth of the microbes.

The following treatment types, are modifications of the activated sludge process.

a) Conventional Secondary

In this process, the effluent from the primary treatment stage is conveyed to an aeration section where it is thoroughly mixed by the introduction of air for approximately 6 to 8 hours. The air provides sufficient oxygen and contact through agitation with the new wastes to ensure that an efficient decomposition of the wastes occurs. An optimum balance between the incoming food, (primary effluent) and the population of the mixed biological community is maintained by adding a portion of the activated sludge to the beginning of the aeration section. Excess activated sludge together with some liquids are directed to the digesters where they receive further treatment. A clear high quality effluent is produced and the removal of BOD and suspended solids ranges from 90 to 95 percent.

b) High Rate

The high rate modification was developed by overloading the conventionally designed activated sludge plants. The organic load in the aeration sections is the highest of any of the other variations of the activated sludge process and the aeration time is proportionately shorter (1 to 3 hours). Excess activated sludge and some liquids are placed in a digester where they are stablized before final disposal. A higher volume of wastes may be handled in a shorter period of time, which makes for a more economical operation. A primary treatment section may or may not be present, and this method is generally used where industrial wastes are encountered.

The high rate type of treatment is reported to have a removal rate for BOD and suspended solids in the 80 to 85 percent range.

c) Extended Aeration

The incoming wastes are immediately placed in an aeration section without primary settling and a longer aeration time is employed usually 18 to 24 hours. Due to the long aeration period a more complete decomposition or oxidation of the wastes occurs.

As with the conventional secondary, a high level of biological activity is maintained throughout the aeration tank by returning some of the activated sludge to the raw sewage influent. Excess activated sludge together with some liquids are placed in a holding tank or sometimes a digester prior to final disposal. The reduction in BOD is usually in excess of 90%.

d) Contact Stabilization

This modification provides a means of varying the contact time between the incoming wastes and the activated sludge. The initial operation is done in a small chamber called a contact aeration tank and usually lasts for 1 or 2 hours. After this short aeration period the wastes undergo settling and the resulting sludge is re-aerated for a further 2 to 6 hours. The total aeration times of the sludge ranges from 3 to 8 hours which allows for the production of the activated sludge required in the contact aeration tank. Excess activated sludge together with some liquids are placed in a holding tank or sometimes a digester prior to final disposal.

The removal of suspended solids and BOD is similar to the conventional secondary method.

e) Oxidation Ditch

An oxidation ditch is a retention channel constructed in the shape of a race track which is equipped with a rotary aerating device, which circulates the wastewater around the channel where the activated sludge process is employed. After the required retention time the treated wastewater is drawn off as new wastes are added, and placed in a settling tank where the sludge is collected and then either returned to the ditch or removed for final disposal. The effluent from the settling tank is clear and of good quality. The removal of BOD and suspended solids ranges from 85 to 90 percent. This process is similar to extended aeration and is usually used in smaller communities.

2.2 Lagoons, Aerated Cell and Aerated Lagoon

A lagoon is a flat bottomed structure composed of earth dikes and sized to retain the wastewater for a designated period of time. The lagoon employs many complex systems working together in a cyclical manner. For example, the bacteria converts the organic matter into available plant food and promotes the growth of algae, which is one of the simplest forms of plant life. The algae, with the aid of sunlight, produces oxygen which is required to maintain good bacterial activity on the incoming wastes. Also, the bacteria, with sufficient food (wastes), grow and give off carbon dioxide, which is needed to sustain the algae's life cycle. During the retention period these natural processes work together to decompose and effectively stablize the wastes. The efficiency of these processes are dependent on several factors such as liquid depth, temperature, algae growth, waste characteristics, etc. When conditions are at an optimum, then a good quality effluent may be expected.

Some lagoons, or waste stabilization ponds may be aerated, by either mechanical stirring or the bubbling of air into one small cell (aerated cell) or throughout the entire lagoon (aerated lagoon). Aeration reduces the retention period, increases the capacity of the existing lagoon and is useful in treating some industrial wastes. 80 to 85 percent removal of BOD and suspended solids may be expected.

2.3 Trickling Filter

The trickling filter is simply a bed of stones from 3 to 6 feet deep to which primary treated sewage is equally distributed. Bacteria adhere to and multiply on the surfaces of these stones until they can consume most of the organic matter. Treated water trickles out through a network of pipes in the bottom of the filter where it is collected and directed to a final clarifier before final disposal. BOD and suspended solids removal by this process has been reported from 75 to 90 percent. Trickling filters have generally been employed in the more temperate climates.

3. Tertiary Treatment

Tertiary treatment processes are applied to secondary effluent to further upgrade the effluent quality for specific receiving water needs.

In Ontario, the only tertiary processes being used on a municipal scale are polishing lagoons and tertiary effluent filtration. These are designated as "effluent polishing" in this publication.

a) Polishing Lagoons

Polishing lagoons offer an opportunity for increased BOD and suspended solids removal at a minimum of cost but require a relatively large land area. Secondary effluent is passed into lagoon where it is retained for several days while the algae-bacterial symbiotic relationship is encouraged to optimize oxidation of the organic waste. A fairly consistent removal of BOD is maintained throughout the year. There is a marked increase in effluent suspended solids during the summer months when algal activity is at its peak and this constitutes a major disadvantage of the polishing lagoon. BOD removals in the order of 40 to 60% from a secondary effluent may be achieved.

b) Effluent Filtration

Filtration of secondary effluent is the most widely applied tertiary process in Ontario. A well designed and operated tertiary filter should achieve a good lowering of suspended solids and is effective in reducing BOD and total phosphorus.

4. Phosphorus Removal

Treatment for phosphorus basically consists of the addition of a chemical which through precipitation lowers the phosphorus in the effluent to a specified amount. Phosphorus must be reduced to one part per million (1 ppm) or milligram per litre (mg/l) in all designated plants in the Lower Great Lakes drainage basin. Designated plants in the Upper Great Lakes and Ottawa River drainage basins must reduce influent phosphorus by 80 percent or to 1 ppm. Phosphorus removal facilities can be incorporated into any existing treatment works and the chemicals generally used are lime, aluminium salts or iron salts. New chemicals to be used in any plant must first undergo treatability studies to determine if the desired reduction of phosphorus is achieved with no upset in plant operation and to ensure that the quality of effluent has not suffered any deterioration.

Important side benefits of increased removal of organic material and suspended solids occur when phosphorus treatment is employed in primary plants and lagoons with seasonal discharge. Secondary plants and continuous discharge lagoons do not enjoy these benefits; however, secondary plants report better settling in the final stages.

FACTS

Ministry of the Environment

Ontario

Hon. Andrew S. Brandt, Minister

Brock A. Smith, Deputy Minister

Publication Code AFS5

ABOUT PHYTOTOXICOLOGY

Revised
Summer 1983

HOW AIR POLLUTION AFFECTS VEGETATION

Responses to air pollution can become manifest in various ways. Pollutants can injure vegetation, endanger human and animal health, soil buildings and clothing, contribute to highway accidents by reducing visibility, help depress property values and generally interfere with our aesthetic enjoyment of the landscape.

Vegetation injury due to air pollution is an area of particularly serious concern. It can range from visible markings on foliage to reduced growth and yield to premature death of plant life. The ensuing visual and economic consequences can at times be disastrous. Injury to crops possessing marketable foliage such as lettuce or tobacco can result in especially high losses.

Investigation of Vegetation Damage in Ontario

The Air Resources Branch of the Ministry of the Environment is responsible for the assessment of air quality and its effects to aid in the control and prevention of air pollution in Ontario.

The Phytotoxicolgy Section is responsible for determining the degree and extent of air pollution injury to all types of vegetation throughout Ontario. (Any pollutant that injures vegetation is a phytotoxicant.) The section pursues its objectives by:

1. Investigating requests from the public concerning suspected air pollution injury to vegetation -- forests, orchards, farm crops, ornamental plantings -- in both rural and urban areas. In so doing it is necessary to differentiate pollution injury from similar injuries caused by insects, disease, adverse weather, poor nutrition or mismanagement.

2. Conducting assessment studies in areas of concern where adverse effects on vegetation may occur as a result of emissions from existing or future sources of air pollution. If ambient air quality records coupled with vegetation data indicate the biological component of the environment to be in danger, then prompt abatement action is taken.

3. Carrying out practical research studies under controlled environment conditions on the effects of air pollutants on vegetation. These studies are conducted to complement field investigations, screen resistant plant species and determine air quality criteria for the protection of agriculture and forestry.

The staff of the Phytotoxicology Section consists of forest and plant pathologists, agricultural specialists, plant ecologists, soil specialists, a histopathologist, a biostatistician, and greenhouse and laboratory technicians. The Phytotoxicology controlled environment facility is located in Brampton.

In the Phytotoxicology laboratory, vegetation samples collected during complaint or assessment visits are examined by pathological and histological techniques, and processed for chemical analysis. A herbarium is maintained to demonstrate, compare, and diagnose plant material damaged by particular air pollutants.

Studies conducted in some areas include the growing of plants in specially designed shelters equipped or not equipped with devices to filter the ambient air. Certain plant species and varieties which are especially sensitive to various air pollutants are raised in a filtered-air greenhouse under uniform culture for use in field experiments.

The Environmental Protection Act, 1971, has made provision for a Board of Negotiation to mediate the settlement of claims of persons whose forests, crops, or livestock are damaged by air pollution and have suffered an economic loss.

Phytotoxicology personnel investigate over 200 air pollution vegetation complaints each year. Vegetation suspected of being injured by air pollutants included ornamental flowers, shrubs and trees; garden fruits and vegetables; stored vegetables; greenhouse flowers and crops; farm crops (white beans, tomatoes, green onions, winter wheat, oats and corn), animal pastures and cured hay; and fruit and forest trees.

Suspected air pollutants and those ascertained as causing vegetation injury included fluorides, sulphur dioxide, ozone, peroxyacetyl nitrate, acid rain, boron, lead, chlorine, hydrogen chloride, arsenic, zinc, chromium, nickel, cobalt, salt spray, urea, nitrogen dioxide, ammonia, cement dust, magnesium-lime dust, and soot.

The Phytotoxicology Section maintains a close surveillance of vegetation in areas of concern throughout Ontario. Baseline studies are conducted in agricultural or forested areas before a major pollution source becomes operational to determine the pre-operational endemic conditions. Ecological studies keep the Section informed of increasing or decreasing vegetation effects in the vicinity of pollution sources.

Over 3,000 assessment station visits to areas of concern are made annually by Phytotoxicology personnel. During both public request and assessment investigations, over 10,000 soil and vegetation samples are collected each year for laboratory examination.

Effects of Air Pollutants on Plants

Air pollution injury to plants can be evident in various ways. Injury to foliage may become visible in a short time and take the form of necrotic lesions (dead tissue) or it can develop slowly and become manifest as a yellowing or chlorosis of the leaf. There may be a reduction in growth of various portions of a plant. Plants may be killed outright but they usually do not succumb until they have suffered injury perennially.

Injury may not be visible externally with effects occurring sub-cellularly in cell membranes and chloroplasts (plant organelles where photosynthesis takes place). The plants may suffer physiologically due to an upset in the rate of photosynthesis, respiration or transpiration.

Sulphur Dioxide

There is reference to the deleterious effects of sulphur dioxide on vegetation dating back more than 100 years in Europe. In the United States the Experiment Station of the Agricultural College of Utah published a bulletin in 1903 describing the effects of smelter smoke on Utah agriculture. In the 1930's an international problem arose when smelter fumes emitted by the Consolidated Mining and Smelting Company at Trail, British Columbia travelled down the Columbia River Valley to damage forests in Stevens County in the State of Washington. Comprehensive investigations were carried out for about 10 years resulting in the publication of a book by the National Research Council of Canada in 1939. Investigations in the Sudbury district of Ontario started in the 1940's and are still continuing.

Major sources of sulphur dioxide are coal burning operations, especially those providing electric power and space heating. Large quantities of sulphur dioxide can also result from the burning of petroleum fuels and the smelting of sulphur-containing ores.

Sulphur dioxide enters leaves mainly through the stomata (microscopic openings where normal gas exchanges of oxygen and carbon dioxide occur). The toxicity of sulphur dioxide to the mesophyll cells (inner chloroplast-containing cells) of leaves is primarily due to its reducing properties.

Leaf injury is classified as either acute or chronic. Acute injury is caused by absorption of high concentrations of sulphur dioxide in a relatively short time. This results in a rapid accumulation of sulphite which is toxic to the metabolic processes taking place in the mesophyll cells.

Chronic injury is caused by long-term absorption of sulphur dioxide at sub-lethal concentrations. The sulphite formed is oxidized to sulphate at about the same rate that the gas is absorbed. When sulphate accumulates beyond a threshold value that the plant cells can tolerate, chronic injury occurs. It is estimated that sulphate is about 30 times less toxic than sulphite. Chronic effects on trees include foliar discoloration, premature shedding of leaves, reduced radical growth and early death of the trees.

Acute sulphur dioxide injury on broad leaves takes the form of bifacial lesions, which usually occur between veins, and is often more prominent towards the petiole (leaf-stalk). The injury is local. The metabolic processes are completely disrupted in the necrotic or dead areas, with the surrounding leaf tissue remaining green and functional. The green pigments are decomposed and the affected leaf area assumes a bleached, ivory, tan, orange-red, reddish-brown or brown appearance, depending upon the plant species, time of year and weather conditions. The tissue on either side of the veins is extremely resistant. In some cases, injury can occur on the margins of leaves.

Young leaves rarely display necrotic markings whereas newly expanded leaves are most sensitive to sulphur-dioxide injury. The oldest leaves are moderately sensitive. In monocotyledonous (blade-like) leaves the injury can occur at the tips and in lengthwise areas between the main veins. In conifers acute injury usually appears as a bright orange-red tip necrosis on current-year needles, often with a sharp line of demarcation between the injured tips and the normally green bases. Occasionally the injury may occur in bands, in apical, medial or basal locations on the needles.

Chronic sulphur-dioxide injury becomes manifest as a yellowing or chlorosis of the leaf, sometimes from lower to upper surfaces on broad leaves. Occasionally only a bronzing or silvering will occur on the undersurface of the leaves. The rate of metabolism is reduced in leaves displaying chronic injury. In conifers chronic injury on older needles is first indicated by a yellowish-green colour that changed to reddish-brown starting at the tips and developing basipetally (toward the base).

Different plant species and varieties and even individuals of the same species may vary considerably in their sensitivity or tolerance to sulphur dioxide. Susceptibility lists have been made by several investigators but they can be only used as a guide. Variations can occur because of differences in geographical location, climate, and plant stage of growth and maturation.

Vegetation sensitive to sulphur dioxide include alfalfa, barley, eastern white pine, white birch, white ash, trembling aspen, Chinese elm, Manitoba maple and bracken fern.

In cities, trees found resistant to sulphur dioxide pollution in descending order are Ailanthus, pin oak, gingko, Carolina poplar, London plane, Norway maple and little-leaf linden.

Environmental factors conducive to optimum plant growth usually abet sulphur-dioxide injury. They include sunlight, moderate temperature, high relative humidity, wind and adequate soil moisture.

Most investigators have shown a direct relationship between open stomata and the absorption of sulphur dioxide and subsequent leaf injury. When stomata are closed, either at night because of darkness or during the day because of other factors, plants are more resistant to sulphur dioxide. It has been reported that the potato plant is as equally sensitive at night or during the day because their stomata do not close at night.

Vegetation is most susceptible to sulphur dioxide during the active growth months of June, July and August. For acute foliar injury to occur, 0.25 parts per million (ppm) of sulphur dioxide for eight hours or 0.95 ppm for one hour usually must be present. If the environmental factors and growth stages of the plants are not conducive to injury, the plants will escape injury even in the presence of potentially damaging concentrations of sulphur dioxide. Chronic effects have been documented on forest trees exposed to an annual average of about 0.02 ppm sulphur dioxide.

Fluorides

Fluoride injury to vegetation was recognized in Germany over 70 years ago. In addition to vegetation damage, livestock was affected in the vicinity of certain industries.

Fluorides may be discharged into the atmosphere from the combustion of coal; the production of brick, tile, enamel frit ceramics, and glass; the manufacture of aluminum and steel; and the production of hydrofluoric acid, phosphate chemicals and fertilizers.

Sensitive vegetation may be injured when exposed for 24 hours to atmospheric concentrations of hydrogen fluoride of 1 part per billion (ppb). Similar injury symptoms may be produced by higher concentrations for shorter periods of time. The amount of fluoride accumulated in plant tissues depends on the absorption capacity of the plant, its sensitivity to fluorine and ambient air concentrations. High concentrations of fluoride may accumulate in leaves during the growing season while subjected to extremely low concentrations in the air. Bitternut hickory can concentrate up to 1,000 ppm fluoride in its leaves without showing any visible injury, whereas the sensitive gladiolus may exhibit leaf injury with less than 35 ppm fluoride.

Fluorides absorbed by leaves are translocated towards the margins of broad leaves and to the tips of monocotyledonous leaves and coniferous needles. Little injury takes place at the sites of absorption, whereas the margins or tips of the leaves build up lethal concentrations, resulting in necrosis. The rates of translocation and concentration of fluoride are of primary importance with regard to explaining injury to sensitive plants.

Fluoride injury starts as a gray or light-green water-soaked lesion which turns tan to reddish-brown. It can appear within a few hours of a week after exposure depending on plant species and variety, the concentration of atmospheric fluorides, the duration of exposure and various environmental conditions. With continued exposure, the necrotic areas increase in size spreading inward to the mid-rib on broad leaves and downward on coniferous needles.

Fluorides inhibit photosynthesis, the impairment being measurable even before visible leaf injury occurs. With continued fumigation, the decrease in photosynthesis rate parallels the increase in leaf tissue necrosis. Fluorides inhibit enzymes in vitro. A well-known example is enolase, an enzyme required in the glycolytic pathway of plant respiration.

Studies of plant species susceptibility to fluorides showed that pine (developing needles), gladiolus, apricot, prune, plum, grape, tulip, iris, St. Johnwort and sweet corn were most sensitive.

Atmospheric fluorides, by concentrating in foliage and directly injuring plants, pose a threat to the health of livestock. Forage crops may appear normal while actually containing high concentrations of fluroide. Alfalfa, for example, can tolerate several hundred ppm fluoride without showing visible injury. Cattle, feeding on this plant over an extended period of time, may develop the disease fluorosis if the fluoride content is in excess of 40 ppm. The symptoms of chronic fluorine toxicosis are mottled and abraded teeth, swollen periosteal (bone surface) tissue, lameness and, in severe cases, decreased appetite and milk production.

Ozone and PAN

Ozone and PAN (peroxyacetyl nitrate) are the main phytotoxicants in the Los Angeles type of oxidant smog now plaguing many urban areas. Automobile exhaust is the major contributor of the primary pollutants (nitrogen oxides and reactive hydrocarbons) in the photochemical reaction producing the secondary toxic pollutants (ozone and PAN).

Oxidant damage to plants was first observed in the Los Angeles area in 1944. A wide variety of plants are susceptible to oxidant damage. In southwestern Ontario, phytotoxicology surveys conducted annually have revealed the widespread occurrence of ozone injury on tobacco, tomato, potato and white bean crops. Ozone causes a spotting, bleaching or chlorosis of upper leaf surfaces. Typical lesions are produced on tobacco plants by concentration of ozone as low as 0.05 ppm for four hours, crop yields are reduced if exposed to an average of 0.04 ppm of ozone over the growing season during daylight hours. PAN causes bronzing, silvering, or glazing of lower leaf surfaces. Sensitive plants, such as tomato and lettuce have been injured by 15 to 20 ppb of PAN in a four hour exposure. Light is necessary before, during and after a fumigation by PAN to cause visible injury.

Susceptibility to ozone injury is influenced by environmental and plant factors. It is increased by high relative humidity and low carbohydrate content. Ozone injury to broad leaves displays a definite pattern related to the development of functional stomata. The youngest leaves are resistant and with expansion become susceptible at their tips. With increasing maturity the leaves become successively susceptible at middle and basal portions. The leaves become resistant again at complete maturation. Peculiarly, ozone usually enters through the stomata on lower leaf surfaces but injures palisade mesophyll cells in the upper layers of the leaf. In these cells the chloroplasts disintegrate followed by plamolysis (contraction) and desiccation (drying up) of the cellular contents.

In addition to visible injury, growth suppression may result from the effects of oxidants decreasing photosynthesis and changing cell membrane permeability.

Experimental work has shown that sulphur dioxide and ozone may act synergistically to reduce the required concentrations of either gas to produce leaf injury. Ozone as low as 0.027 ppm when combined with 0.24 ppm sulphur dioxide injured Bel W3 tobacco plants in two hours.

Nitrogen Dioxide

Nitrogen dioxide (NO) in high concentrations can cause plant injury symptoms similar to those caused by sulphur dioxide. Under high light intensities, about 6.0 ppm of NO for two hours is required to injure sensitive plant species, such as pinto bean, tomato, and cucumber. Low light intensity increases sensitivity of plants with injury developing after exposure to 2.5 - 3.0 ppm of NO for two hours. Nitrogen dioxide can injure the same plants as ozone and in the same physiological tissue. Injury symptons are different, however, and approximately 10 times as much niutrogen dioxide is required. Long-term exposures of tomato plants to low concentrations of nitrogen dioxide (up to 0.5 ppm for 10 to 22 days) may inhibit plant growth, and increase the green color (chlorophyll content) of the leaves. Experimental work has shown that low levels of NO (0.10 ppm) in combination with SO (0.10 ppm) acted synergistically injuring a number of plant species in a 4 hour exposure period.

Chlorine

Chlorine is not widespread in the atmosphere. It is usually confined to the immediate area surrounding its source. High concentrations of chlorine released in tank car accidents can cause severe defoliation and leaf injury to contiguous vegetation. The symptoms of chlorine injury are quite diverse, and range from terminal and marginal necrosis and chlorosis, to interveinal lesions occuring both bifacially and on upper leaf surfaces only.

Alfalfa and radish plants are injured by 0.1 ppm of chlorine for two hours. This threshold dosage places chlorine between fluorides and sulphur dioxide in phytotoxicity.

Particulate Matter

Particulate matter such as cement dust, magnesium-lime dust and carbon soot deposited on vegetation inhibit photosynthesis. Cement dust may cause chlorosis and death of leaf tissue by the combination of a thick crust and alkaline toxicity produced in wet weather. Deciduous and coniferous trees are injured, the latter occasionally killed. Accumulation of alkaline dusts in soil can increase soil pH to levels adverse to crop growth. Sulphuric acid aerosols produce punctate spots on the upper surfaces of wet leaves.

De-icing compounds applied to roads and highways in winter can result in injury to roadside vegetation caused by splashing of the salt by passing vehicles. Fruit trees such as peach and apple are particularly susceptible to salt spray. The severity of twig dieback injury on the trees decreases with distance from the road and becomes negligible usually beyond 150 feet.

Investigating Air Pollution Injury to Vegetation

Any resident of Ontario who suspects that plant life (ornamentals, crops, orchards or woodlands) or soil in urban or rural areas is being affected by air pollution can request an investigation by the Phytotoxicolgy Section. If the injury or damage is diagnosed as being caused by air pollution and the source is detected, a report of the investigation is sent to both the complainant and the offending source. Abatement engineers are notified to inspect the offending source to prevent further phytotoxic emissions.

The Air Resources Branch encourages private settlement of damages. If this is not feasible, the claimant can request mediation by the three-man Board of Negotiation.

The investigation of an air pollution vegetation complaint at times may be compared to a "Whodunit". Research experience and the application of detective work to plant pathology techniques are essential. Some complaints are solved readily; others require lengthy investigations.

One complainant property in a northern Ontario study was surrounded by seven industries. The local abatement engineer wanted to know what pollutant caused the vegetation injury and which industry was responsible. Through careful investigation of the pattern of injury on both complainant and neighbouring properties, through the knowledge of air pollution injury symptoms and the susceptibility and resistance of various plant species, by examining wind records and by chemically analyzing collected vegetation, it was found that the injury was caused by an acute fumigation of sulphur dioxide and that the source was a sulphite pulp and paper mill. Not only were the complainant and the offending source brought together for settlement of damages, but the industry also purchased new control devices to prevent any further accidental release of high concentrations of sulphur dioxide.

In another investigation of an acute episode, the vegetation injury area was situated between two industries -- an aluminum chloride manufacturer about one mile west and a nickel refinery about one mile southwest. Phytotoxicology personnel made a detailed vegetation survey in the area. No pollution injury was observed near the industry to the west or at locations midway between the injury area and this industry. In the injury area, it was found that trees, shrubs and hedges displayed severe foliar injuries only on their southwest sides. Samples of collected foliage and soil were analyzed for several pollutants that the two industries could emit, such as sulphur, fluoride, chloride, aluminum, copper and nickel. The results showed that sulphur and fluoride contents were normal when compared to control collection analyses, that chloride, aluminum, and copper levels were slightly elevated, whereas nickel contents were present in excessive and toxic quantities. Since nickel was one of the pollutants emitted from the industry to the southwest, this industry was implicated as the offending source.

About 50 per cent of the injuries investigated by the Phytotoxicology Section are found to be due to causal agents other than air pollutants. For example, several complaints were received by the Phytotoxicology Section concerning injury to European mountain ash trees in the City of Cornwall. Upon investigation, it was found that some of the injuries had indeed been due to air pollutants from local sources, but that for the most part the injuries were caused by the disease Cytospora canker which was rampant in the area at the time.

In North Bay, a number of complaints were received regarding heavy particulate fallout assumed to be originating from the superstack at Sudbury 80 miles away. The phytotoxicology investigation showed that the particulate matter was organic in nature and occurred only near white birch trees. The particulate matter was diagnosed as droppings excreted by an insect, the birch skeletonizer, which was heavily infesting white birch trees throughout northern Ontario at that time.

In Sarnia, residents complained in the spring that their houses had been splattered by "purple rain". Samples of the purple spots on paper and some debris collected from the area were examined in the Phytotoxicology laboratory. The spots were found to be caused by a purple pigment which had leached out of specks in the debris, and under the microscope the specks were identified as anthers from white elm flowers. Apparently a rainstorm had dislodged the anthers from the flowers on white elm trees and splattered them on the sides of houses causing the purple spots.

In early June of a recent growing season several complaints were received from the Port Maitland area that maple trees had suddenly developed leaf injuries on the sides of the trees facing a sulphuric acid making plant. A comprehensive investigation was carried out and it was found that this particular leaf scorch was widespread throughout the Niagara peninsula area of Southern Ontario. Chemical analyses, air sampling records, and other studies showed that air pollutants were not responsible for the injuries. Only succulent foliage on silver maple, sugar maple, red maple, and beech trees were found to display the injury symptoms which appeared suddenly in response to weather changes in which a wet, cloudy period was followed suddenly by a sunny, windy period. This abnormality has been named Late-Spring Leaf Scorch (LSLS).

These cases illustrate how other casual agents can injure vegetation creating symptoms that mimic those brought on by air pollution. When it is determined that injury is being caused by a biological agent or by poor management, the grower is advised to seek combative measures or management advice from the agency authorized to handle such matters.

Prevention of Phytotoxic Effects

The protection of plants from the adverse effects of aerial phytotoxicants cannot be carried out in exactly the same manner as is possible with disease-causing, organic reproductive bodies. A pollution-diseased plant cannot infect another plant; thus there is no need for a quarantine or for eradication of the affected plants. In certain instances, sprays and dusts have protected plants from air pollution injury. The development of resistant varieties holds some promise. The best control method, however, is to reduce the concentrations of noxious pollutants at their sources so as not to exceed the established air quality criteria for agriculture and forestry.

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FACTS

Ministry of the Environment
Ontario
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

ABOUT POLYCHLORINATED BIPHENYLS (PCBs)

(Revised February 1984)

What are PCBs?

Polychlorinated biphenyls are a class of man-made organic chemicals produced by the direct combination of chlorine and biphenyl, a derivative of benzene. There are 209 theoretical possible combinations of chlorine and biphenyl but commercial preparations contained only up to 80 different PCB compounds.

PCBs are clear, colourless viscous liquids which have the appearance of mineral oil. They are insoluble in water and in fact are denser than water such that they sink to the bottom when added to water. PCBs are stable, non-flammable and resistant to chemical attack. However, these very properties, which first prompted their commercial production and industrial exploitation in 1929, have contributed to their widespread distribution and stability in the environment.

How are they used?

PCB uses can be classified as dispersive or closed-system. The dispersive uses were as extenders and plasticizers in a variety of sealants, caulkings and coatings, as additives in carbon papers and printing inks and as automotive and industrial hydraulic and heat exchange fluids. As these materials were discarded, the PCB component became dispersed in the environment. Closed-system usage included electrical insulating fluid applications in commercial and industrial electrical transformers and capacitors and in some classes of closed industrial heat transfer systems.

No PCBs have been sold in North America for dispersive applications since 1972, as a result of a voluntary ban on such sales by the sole North American producer, Monsanto Chemical Corporation. (There were never any production facilities in Canada.)

Since that time, regulations under the Canada Environmental Contaminants Act, and corresponding legislation in the United States, have effectively banned all uses of PCB except in existing electrical equipment operating prior to the date of the ban (in Canada, July 1980).

Regulation 11/82 of the Environmental Protection Act of Ontario provides for the on-site interim storage of PCB wastes by owners of PCB equipment provided that such storage is authorized by the Ministry. Furthermore, all movements of wastes to and from storage sites on public roads must be via carriers licenced under authority of Regulation 313 of the Environmental Protection Act.

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The production of PCBs was banned by the Toxic Substances Control Act in the United States in 1976. The estimated North American production since 1929 is about 700,000 metric tons, of which approximately 50 per cent remains in existing electrical equipment. About 9,000 metric tons are still in use in electrical equipment in Ontario.

Are PCBs dangerous?

For many years, isolated reports in industrial medical literature concerning the toxic effects of PCBs attracted little general interest. In terms of acute toxicity, that is, the level of exposure necessary to cause an acute and immediately harmful effect, PCBs are relatively low on the scale and significantly less toxic than many other more common industrial and consumer chemical products. Direct contact with high concentrations of pure PCB may produce health effects ranging from mild skin rash to severe toxicity depending on the degree of exposure and, hence, the quantity ingested.

Public awareness has been aroused by incidents such as the poisoning of about 1,000 people in Yusho, Japan, in 1968 from the gross contamination of rice oil by PCB heat exchange fluid. This led to the voluntary restriction on sales by Monsanto in 1972 to closed-system electrical equipment manufacturers. There is now evidence to suggest that the effects of the poisoning may have been related not only to PCBs but also to more toxic contaminants contained in the PCB heat exchange fluid.

As equipment became available in the 1960s to enable the measurement of trace levels of PCB in the environment, the significance of these environmental levels began to be assessed by numerous research workers conducting animal feeding studies. The results of these studies indicated the potential for PCB to be a cancer-causing substance and confirmed the potential to interfere with reproductive processes.

There is little scientific evidence to indicate that any of the chronic effects shown in animal studies are exhibited in humans either exposed to PCB in the workplace or exposed to the current levels in the environment. Taking this into consideration, it is a simple matter of prudence for environmental and health authorities to take measures to restrict and prevent human exposure to PCBs. It remains a matter of public concern. It is not, however, a matter which warrants the degree of public alarm so often associated with PCB spills or other evidence of release of PCBs into the environment.

The real environmental concern is that PCBs are very stable in the environment and are absorbed and accumulated by many life forms. PCBs become more concentrated as they pass up food chains from one life form to another (bio-magnified). They are present in some foodstuffs, particularly those derived from fish and animals that are at the end of their respective food chains. As well, PCBs are present in trace levels in ambient air and in natural waters and sediments.

The principal health concern centres on this passage of PCBs up food chains, such that they gradually become concentrated in the fatty tissue of fish, birds and animals which may form part of the human diet.

Levels of PCBs in edible fish are of immediate concern, particularly from the standpoint of consumption of fish caught by sports fishermen. Commercial fish catches in the Great Lakes cannot exceed the federal guideline of two parts per million maximum PCBs that thas been established by Health and Welfare Canada.

Sports fish, particularly salmonid species that were introduced into the Great Lakes by various state and provincial agencies, show evidence of high levels of contamination. To meet this concern, Ontario publishes information on testing of fish for contamination and issues advisories on the consumption of fish which have accumulated traces of PCBs or other contaminants such as mercury.

PCBs are widely distributed in the environment. Airborne transport is evident from the fact that scientific data gathered from around the world show the presence of PCBs in areas remote from industrial influence such as Bermuda, Hawaii and the polar ice cap. Detectable levels are found in the vicinity of most urban and industrial centres in North America.

The prevalance of this contaminant strengthens Environment Ontario's opinion that PCB-contaminated material ultimately must be destroyed rather than running the risk that it enters the environment, and hence the food chain.

In order to address the issue of environmental contamination, and subsequent bio-magnification up food chains, it is necessary to restrict input of PCBs to the environment. In North America this has been implemented by restriction on the manufacture, sale, distribution and usage of products containing PCBs; by restriction on the storage, handling and disposal of PCB wastes and by the development and application of the most advanced technologies available for waste destruction and disposal.

Destruction of PCBs

High-temperature incineration has been identified by all regulatory authorities in North America as the safest and most effective method of PCB destruction. This may be achieved in specially designed high temperature incinerators or in suitably modified industrial furnaces. High temperature incineration can achieve PCB destruction efficiencies in the order of 99.9999 per cent and experimental burning of PCB mixtures at the St. Lawrence Cement plant in Mississauga reflected a destruction efficiency of at least 99.986 per cent, while realizing other benefits to the cement company such as fuel savings and the production of low alkali cement. This technology has been successfully applied in Europe.

However, because of public objections no full-scale PCB destruction facility has been established anywhere in Canada. Numerous private and public sector proposals for PCB destruction have been frustrated by public opposition. Consequently, efforts have been directed towards the development of more advanced technologies for PCB destruction (with a view to improving public acceptance). In addition, all movements of PCB wastes to and from storage sites must be via carriers licenced under authority of Regulation 313 of the Environmental Protection Act.

Since 1979, the Ministry of the Environment has provided about $2 million for research and development into methods of PCB destruction and disposal. These have included incineration and plasma arc technologies. (A plasma arc is a high temperature gas induced by an electric arc. Through its use, extremely high temperatures can be achieved in a small container sufficient to cause molecular disintegration of PCB.)

Other technologies that have been considered include combustion-induced plasmas, microwave plasma-induced oxidation, wet-air oxidation, chemical reduction with metallic sodium derivatives, biological degradation and diesel engine combustion.

An estimated six million litres (1.25 million gallons) of PCB liquids are in service in Ontario. In addition, about 100,000 gallons of wastes are in storage awaiting disposal. This will gradually increase as PCB-filled electrical equipment is replaced or taken out of service.

The availability of PCB destruction technology is not, however, the issue in the resolution of the disposal problem. It is the public's concern about the hazard associated with the siting of destruction facilities which has prevented the destruction of PCB by any means.

As a society, we must begin to recognize that enormous emotional and financial resources have been directed towards attempts to resolve the PCB disposal problem with no tangible result, while other, more pressing waste management and environmental issues may have received correspondingly less attention.

Environment Ontario is moving towards the development of regulatory proposals which will facilitate the establishment of mobile PCB destruction facilities. At the same time, the long term hazardous waste management and disposal requirements will be addressed by existing private sector facilities and new facilities to be established by the Ontario Waste Management Corporation.

Environment Ontario needs the support and encouragement of the citizens of Ontario to ensure that these efforts will achieve the establishment of safe, effective PCB destruction facilities in Ontario.

FACTS

Ministry of the Environment
Ontario

Hon. Jim Bradley
Minister

Rod McLeod
Deputy Minister

ABOUT AIR POLLUTION JULY 1984

ADVERSE EFFECTS OF TRANSBOUNDARY OZONE POLLUTION ON ONTARIO VEGETATION

Visible injury to vegetation which was first reported in the vicinity of Los Angeles in 1944 was one of the earliest indicators of photochemical oxidant air pollution. However, it was not until 1958 that ozone, now recognized as the major component of photochemical smog and one of the most damaging of all air pollutants affecting vegetation, was identified as a direct plant injurious compound in the oxidant complex. The other photochemical oxidants which also are formed through the action of sunlight on reactive hydrocarbons and nitrogen oxides include nitrogen dioxide and the peroxyacylnitrates. Although both the latter pollutants have been scientifically documented as plant injurious compounds, their overall significance with respect to transboundary movement and direct vegetation effects in areas remote from the major industrial centres either is of minor importance or is not yet sufficiently documented to warrant consideration at this time.

Nowhere in Canada has the problem of ozone injury to vegetation been as extensive or as well documented as in the southwestern portion of the province of Ontario. The first indication of transboundary ozone movement across Lake Erie was documented in 1960 following work on the incidence of weather fleck on tobacco and meteorological conditions associated with the build-up of ozone. Since then it has been shown that high ozone levels in Southern Ontario generally are associated with regional, southerly air flows which have passed over numerous urban and industrialized areas of the U.S. Contributing to this transboundary influx of ozone are the numerous urban sources (Metro Toronto, Sarnia, Hamilton, Windsor) which result in higher levels in fairly localized downwind patterns.

Visible foliar injury resulting from exposure to atmospheric ozone usually is apparent either as dark coloured, upper surface lesions, tissue bleaching, or as general yellowing and pre-mature leaf drop. The injury is characteristically interveinal in nature; however, in many species the lesions can become more prevalent along the sides of the larger veins and actually develop over the smaller veinal tissue. The development of systems also is very closely associated with tissue age with leaves ranging from 65-95% of full size being the most sensitive. Young, recently developed leaves are considerably more resistant, as in most cases, are older, fully mature leaves.

AGRICULTURAL CROPS

Foliar responses of crops to natural or artificial exposure with ozone have been well documented and used in the development of species and varietal sensitivity listings and the preparation of short-term predictive dose-response curves for standards setting purposes. However, it is now apparent that this information may not be reliable for estimating the total effect of ozone on final crop productivity (e.g. yield, quality) as more recent studies now indicate that the severity of foliar symptoms is not a consistent indicator of crop growth or

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yield effects. In fact, there have been several reports published which demonstrate that ozone related yield reductions have occurred in the absence of any visible leaf symptoms over the duration of the growing season. These types of studies involving the long term assessment of yield or quality parameters under field conditions are complicated by the ubiquity of ozone exposure, the effect of meteorological variables on ozone distribution within crop canopies, and the difficulty in establishing ozone-free control plots. Numerous biotic (pathogen/genetics) and abiotic factors (temperature, humidity, light and soil moisture) within the environment also must be taken into account as each can modify the response of the crop to ozone exposure. The difficulties in dealing with these variables have been partially overcome by recent progress which has been made in the development of field assessment techniques for long term plant growth and productivity effects. These include open top field chambers, pollutant exclusion methods, open air fumigations, ambient air pollutant gradients and the use of chemical protectants.

Since 1970 the Ministry's Phototoxicology Section has conducted extensive foliar injury assessment programs for the major crops (white bean, tomato, potato, tobacco) affected by ozone. These surveys have included the visual examination and microscopic, laboratory confirmation of plant damage at over 1200 Ontario locations since 1970. The degree of foliar injury has varied considerably from year to year reflecting differences in the severity and timing of the ozone episodes relative to the stage of development and sensitivity of the various crops as well as in climatic factors which influence the sensitivity of plant foliage to ozone injury. These studies, together with Ministry funded research projects by scientists at the University of Guelph, and other published scientific information have recently been utilized by Ministry staff in the assessment of the economic impact of ozone on crop production for the following 15 sensitive Ontario crops: white bean, potato, onion, sweet corn, lettuce, radish, spinach, rutabagas, tomato, cucumber, green bean, soybean, grape, wheat and tobacco. This information indicates that Ontario farmers would benefit by up to 29 million dollars annually if Ontario's 1 hour ozone criterion of 80 parts per billion was met in all parts of the Province.

FORESTS

There are many different parameters and limiting factors which must be considered in evaluating and quantifying the effects of ozone on forest trees as compared to agricultural crops. Forest tree species are long-lived, perennial plants that are exposed to ozone repeatedly during the year and over several years and, unlike agricultural crops, are not usually subjected to fertilization, irrigation and pesticide application or other cultural practices that can moderate their response in the field. Assessment of adverse effects of ozone on seedlings or young trees can be evaluated under controlled conditions; however the large size of trees at maturity precludes experimental pollutant exclusion (chamber) studies or the use of protective antioxidant sprays thereby limiting the assessment of yield losses to visual observations of foliar injury, and radial and height growth characteristics of individual trees in the stand. Where growth analysis is undertaken from different stands on the basis of air quality gradients, the data must then be considered in terms of soil and climatic site variation and related to ozone dose information, where available. Another

...3

complicating factor which must be addressed when assessing the overall impact of ozone on forest growth and yield is the process of tree to tree competition and possible alterations in the composition and evolution of the ecosystem under study. In this regard an adverse effect on the growth or survival of one tree species could have either a beneficial or determined effect on the growth or survival of another species thereby increasing or decreasing the total productivity of a mixed forest stand.

On the basis of artificial ozone fumigation exposures, many tree species common to Eastern North America are classified as being susceptible to foliar ozone injury. In Ontario foliar symptoms associated with ozone injury to white ash and Eastern white pine have been observed by MOE staff. There are, however, few available studies which quantify the severity of the ozone foliar symptoms relative to the total annual yield of these or other tree species. The one advantage which is enjoyed by Ontario's forest industry is the fact that ozone levels generally decrease in a south to north direction and thus are lowest in the areas where forests predominate. For this reason forest yield losses due to ambient ozone in northern Ontario are considered to be low when compared to the high yield losses which occur in the agricultural areas in southern Ontario.

FACTS

Ontario
Ministry of the Environment
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

Publication Code: WFS3

Revised
Summer, 1983

ABOUT SEPTIC TANK SYSTEMS

May 1985

Introduction

This fact sheet is produced for the convenience of the general public and should be distributed in conjunction with the application form for a certificate of approval. If this sheet does not answer all your questions or leaves a problem unresolved, you should then contact your nearest Ministry of the Environment office or local health unit office in your district.

For definition purposes in relation to septic tank systems serving dwellings, sewage is defined as waste of domestic origin which is human body waste, toilet or other bathroom-waste, waste from other showers and tubs, liquid or water borne culinary and sink waste or laundry waste.

Sewage Disposal

A correctly designed and constructed and maintained sewage disposal system will function effectively and safely, but a system which is badly designed and located, or badly constructed, or which is not adequately maintained thereafter, can lead to considerable nuisance and expense, and may seriously endanger health and the environment.

The Law and Sewage Disposal

Section 64 of The Environmental Protection Act is specific with respect to the approval which it is necessary to obtain for the construction of a private sewage disposal system or its alteration or enlargement. It applies to all property in Ontario and states:

> *"No person shall construct, install, establish, enlarge, extend or alter,*
> *(a) any building or structure in connection with which a sewage system will be used if the use of the building or structure so constructed, installed, established, enlarged, extended or altered will or is likely to affect the operation or effectiveness of the sewage system; or*
> *(b) any sewage system,*
> *unless a certificate of approval for the construction, installation, establishment, enlargement, extension, or alteration of the sewage system has first been issued by the Director."*

The preceeding extracts from The Act make it clear that a certificate of approval for the sewage system is necessary before any related building construction commences. Evidence that a certificate of approval has been issued for the proposed building is normally required by the authorities before a building permit is issued. Aside from this legal requirement, it is in your best interest to get advice before you start to build because the sewage disposal system may be the determining factor in establishing the location and ground elevation of your house or other building. Information concerning regulations can be obtained from the local offices of the Ministry or the agency, normally the local health unit, holding the delegated authority. Application forms and general information can also be obtained from these offices.

In addition, the regulation prescribes the following for the operation and maintenance of all sewage systems:

- Except for a Class 7 sewage system, the sewage system or any part thereof shall not emit, discharge or deposit sewage or effluent onto the surface of the ground.
- Sewage or effluent shall not emit, discharge, seep, leak or otherwise escape from the sewage system, or any part thereof into a piped water supply, well water supply, a watercourse, ground water or surface water.
- Sewage or effluent shall not emit, discharge, seep, leak or otherwise escape from the sewage system or any part thereof other than from a place or part of the sewage system where the system is designed or intended to discharge sewage or effluent.
- Insects and animal life shall be prevented from gaining access to sewage contained in the sewage system.
- No sewage system or any part thereof shall emit, discharge, deposit or allow the emission, discharge or deposit of micro-organisms of intestinal origin into the natural environment in such a manner as may be a hazard to health.
- No gas shall emit, discharge, or otherwise escape from the sewage system into any building or structure except in the manner in which the sewage system was designed or intended to emit or discharge gas.
- No connections to the sewage system from non-sewage waste water sources shall be made.
- The operator of the sewage system shall keep it maintained at all times so that its construction remains in accordance with the certificate of approval and any order made under The Act.

Soil Assessment

The suitability of the soil for absorbing the liquid waste depends on such characteristics of the soil as its grain size and gradation, the presence of organic compounds, and its structure, density, moisture content, "plastic" properties and chemi-

cal composition. These characteristics must be assessed and a judgement made as to the percolative capacity of the soil for handling septic tank effluent.

In order to make this assessment an inspection must be made of the property. As a result of the inspection and any soil testing undertaken, the percolation rate, "T" time, expressed in minutes per centimetre, is selected and used in the accompanying tables.

Absorption Trench Leaching Bed Design— see Drawings 1 and 2

Under normal conditions the ideal location for a leaching bed is in a well-drained sandy loam soil, remote from any wells or surface water. The regulation requires the bottom of the absorption trenches to be at least 0.5 metres above the high ground water table and at least 0.9 metres above the maximum elevation of rock or a soil with a percolation time of greater than 50 minutes per centimetre.

Where water table is the limiting factor it is the highest water table that is of concern rather than the average or that found at the time of site investigation.

Gravity flow is permitted for leaching beds with up to 150 metres of distribution pipe. If required by topography a pump may be used to lift the effluent to a point where gravity flow will resume. Where the total length of distribution pipe required is 150 metres or more, the sewage system shall have a pump or siphon, contained in a separate compartment, that may be part of the tank structure, so designed and constructed that it will be capable of discharging from the compartment, within a period not exceeding 15 minutes, a volume of tank effluent not less than three quarters of the total interior volume of the distribution pipe.

The maximum length of any single absorption trench in a leaching bed is 30 metres.

The area of a leaching bed should generally be free of trees and bushes so that the bed is well aired and sunlight is able to reach the surface. Trees will only be permitted within the area of the bed if it is judged that no damage will occur from the roots considering the size and type of the tree and the arrangement of the tile or pipe runs.

A good growth of grass should be encouraged and maintained over the entire leaching bed area. The roots of grass and plants absorb liquid in the soil and transpire it to the atmosphere through the leaves. Sunlight should be allowed to reach the bed to promote evaporation. Traffic which can destroy the cover of vegetation and compact the soil above the bed should be avoided.

Beds on Sloping Sites

Leaching beds constructed in the conventional manner (Drawings 1 and 2) require sites that are level, or only slightly sloped. The economics and other problems of levelling the required area will generally limit conventional construction methods to slopes of not greater than 1 metre rise in each 10 metres horizontal distance (10%). Special methods of installation are required where more steeply sloped sites are encountered. Information on these may be obtained from Ministry or health unit offices and may be used on sites sloped from Ministry or health unit offices and may be used on sites sloped from 10% up to 25% (1 vertical to 4 horizontal). Leaching beds are not to be constructed on areas where the slope exceeds 25% in any direction.

Raised Leaching Beds—Drawing 3

In cases where 0.9 metres of acceptable soil is not available under the pipe trenches and above rock or an unacceptable soil, a solution may be found by constructing a leaching bed of selected material to form a mound in which the absorption trenches can be set so that the desired 0.9 metre clearance below the trenches is obtained. An unacceptable soil is one having a percolation rate "T" in excess of 50 minutes per centimetre. Similarly a raised bed may be required to provide the 0.5 metres minimum clearance between the bottom of the trenches and high ground water table.

Where high ground water, or a shallow depth of acceptable soil, requires the construction of a leaching bed in imported fill, vertical absorption of the treated sewage in the soil will be restricted. There will be increased lateral movement in the soil in any direction in which ground water will flow away from the bed. To guard against this liquid breaking out to the surface the regulation requires that there be at least 0.25 metres of acceptable soil cover for at least 15 metres beyond the outer pipes in any direction that this in ground movement will take place. If surface soils are acceptable, but of indadequate depth, more soil must be added to provide the required depth. If soils of T-time exceeding 50 minutes per centimetre are at the surface there is no option but to add acceptable soils to meet the mantle requirement.

The quality of imported fill is also restricted by regulation to prevent the construction of a leaching bed in a granular material which is placed directlly on a relatively impermeable soil with no provision for lateral dispersal. The restriction only applies where the upper 0.25 metres of natural soil has a percolation time exceeding 15 minutes per centimetre.

Filter Type Leaching Beds—Drawing 4

A filter type bed is one in which a distribution pipe network is set in a continuous layer of stone above a filter bed of sand which is specified in the regulation as to depth and material. The surface of the filter sand has the same clearances above rock or a soil of T-time greater than 50 minutes per cm or above high ground water table, as is required for the bottom of an absorption trench. A filter type bed offers some space saving as far as the sewage treatment area is concerned, but the problem of dispersal of the treated sewage in the soil, and the need for a soil mantle to prevent its breakout to the surface, are the same. As it concentrates the application of sewage to the soil over a smaller area this problem may be accentuated. Filter beds are not an acceptable option to an absorption trench bed if:

- The specified filter medium is not obtained.
- The daily sewage flow exceeds 5,000 L.

Filter beds are designed according to the permissible sewage loading and other regulatory requirements. A typical sand filter is shown in Drawing 4.

Clearances for Parts of a Septic Tank System

In locating a septic tank system all the clearance listed hereunder are to be measured horizontally.

A septic tank should not be closer than:

- 15 metres to any well, lake, river, stream, water course, pond, spring or reservoir.
- 1.5 metres to any building or structure
- 3 metres to any property boundary.

The distribution pipe in a leaching bed shall not be closer than:

- 15 metres to a well with a watertight casing to at least 6 metres below ground
- 30 metres to a spring used as a source of potable water or a well other than a well with a watertight casing to a depth of at least 6 metres.
- 5 metres to any building or structure.
- 3 metres to any property boundary
- 15 metres to a lake, river, pond, stream or reservoir or to a spring not used as a source of potable water.
- The distribution pipe clearance listed above must be increased in any direction in which the surface of the leaching bed is raised above natural grade. The increase is 2 metres for each 1 metre raised.

The above distances are minimum according to the regulation and may have to be increased to prevent pollution if soil or other site conditions so dictate.

ABSORPTION TRENCH LEACHING BEDS LENGTH OF DISTRIBUTION PIPE IN METRES FOR VARIOUS DESIGN SOIL PERCOLATION TIMES (T) FOR PRIVATE DWELLINGS

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Number of Bedrooms	T from 1 to 5 min. inclusive	T greater than 5 min. but not greater than 10 min.	T greater than 10 min. but not greater than 15 min.	T greater than 15 min. but not greater than 20 min.	T greater than 20 min. but not greater than 25 min.	T greater than 25 min.
2 or less	40	40	70	100	130	5.5T
3	40	60	100	140	180	8T
4	40	80	130	180	230	10T
for each bedroom over 4 add	5	12	20	27	35	1.5T

NOTES: This table is for domestic systems only. It does not apply to schools, motels, hospitals or other such public or commercial premises.

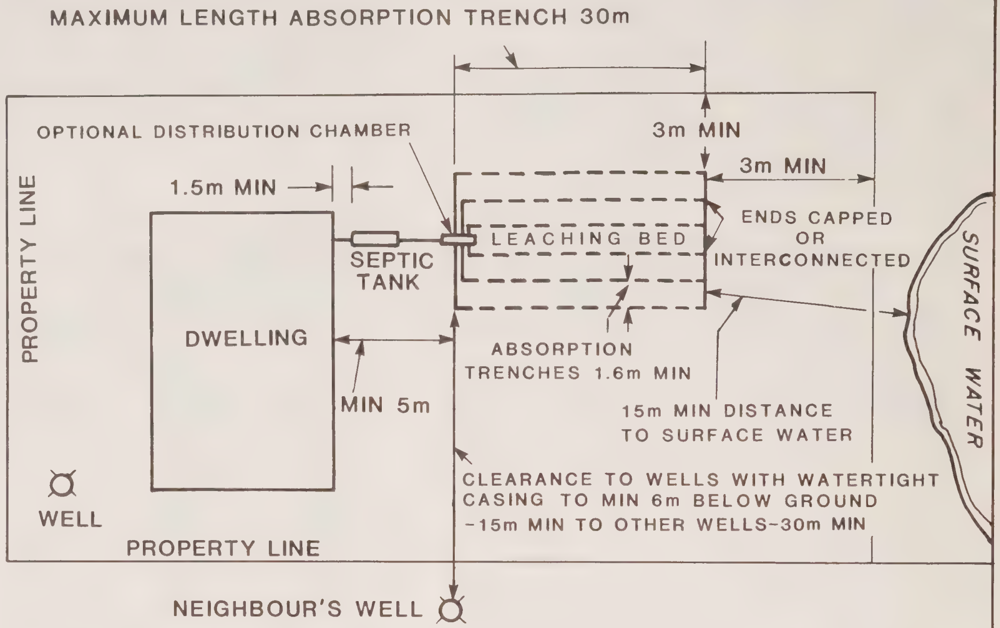
MINIMUM AREA OF THE SURFACE OF THE FILTER MEDIUM IN FILTER TYPE LEACHING BEDS FOR PRIVATE DWELLINGS—SEPTIC TANK SYSTEMS

NUMBER OF BEDROOMS	MINIMUM SURFACE AREA OF FILTER MEDIUM—SQUARE METRES
2 or less	15
3	22
4	28
For each bedroom over 4 add	4

SEPTIC TANK MINIMUM SIZE REQUIREMENTS FOR RESIDENCES

COLUMN 1	COLUMN 2
Number of Bedrooms	Working Capacity in Litres
Two bedrooms or less	2,700
Three bedrooms	3,600
Four or Five bedrooms	4,500

Drawing No.1



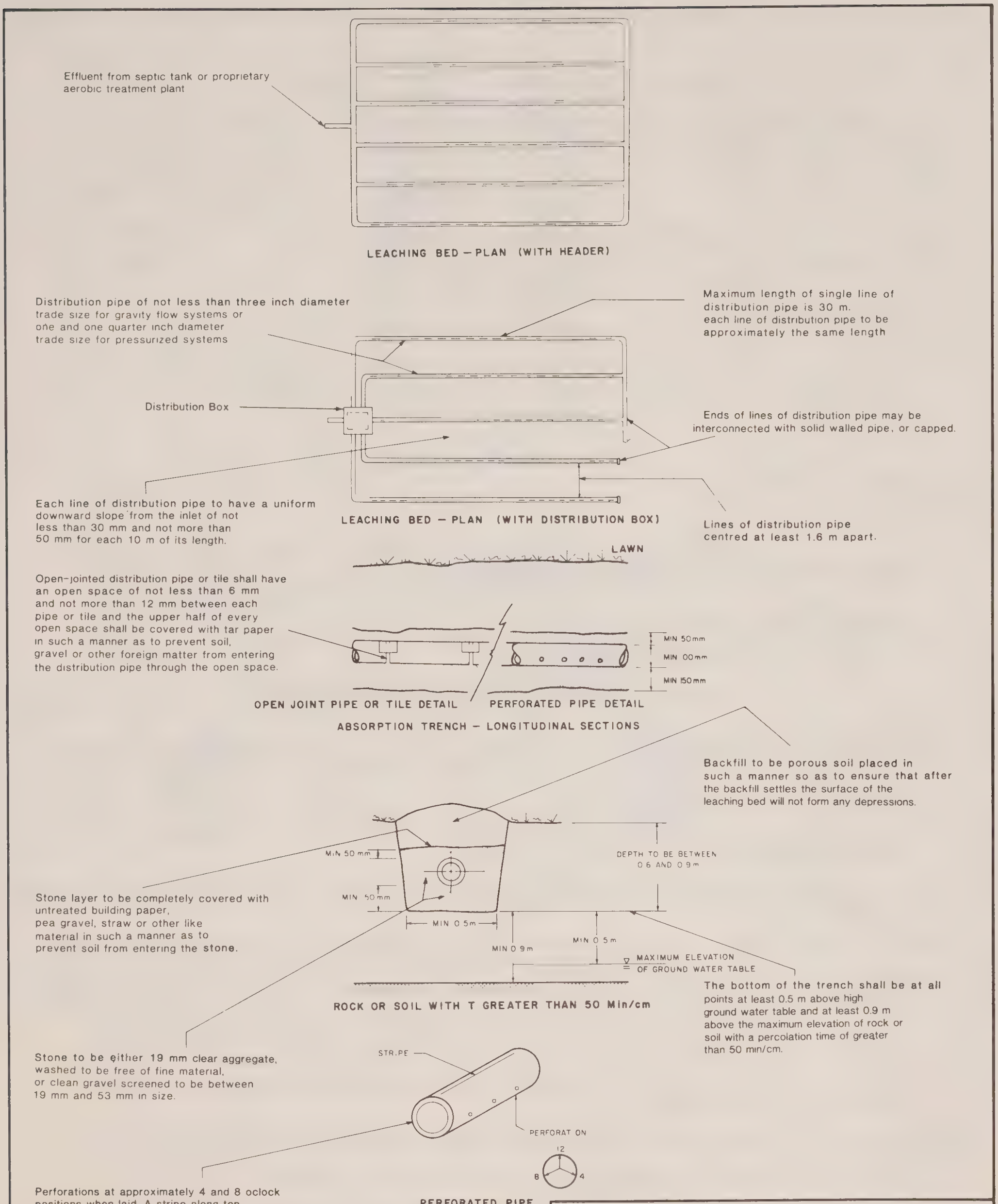
TYPICAL ARRANGEMENT OF A SEPTIC TANK SYSTEM

NOTES:

1. The above layout is suitable for a leaching bed using normal construction methods.
2. Location of tank and leaching bed to be on lower ground than adjacent wells or springs, if possible.
3. Internal plumbing and main drainage outlet should be designed with a view to connecting to possible future sanitary sewers.
4. Roof water, surface water, discharge from footing drains, etc. must be excluded from entry to septic tank.
5. Leaching beds NOT to be located in swampy ground or in ground liable to flooding.
6. See the Regulation regarding details for the siting of the septic tank and tile bed.

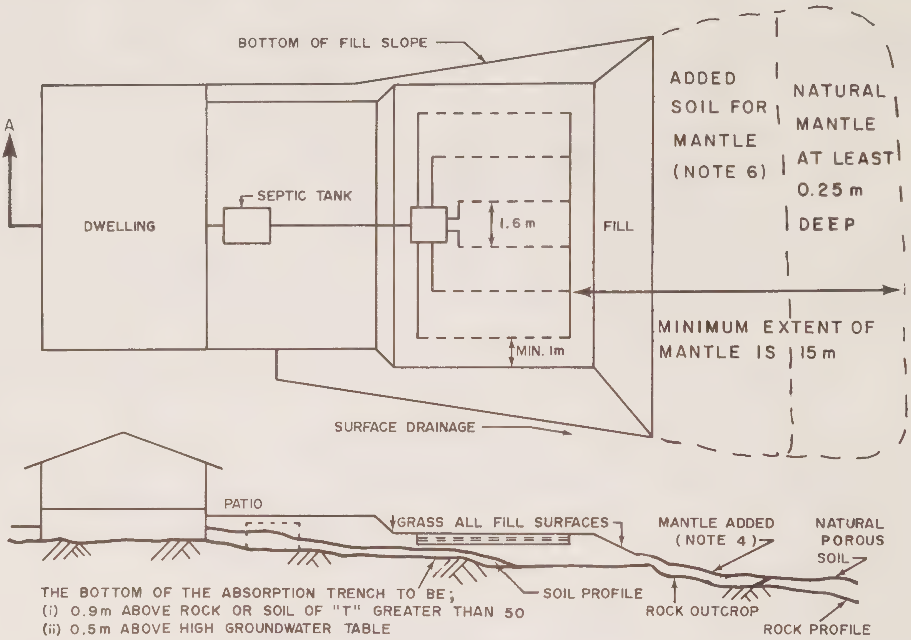
MINISTRY OF THE ENVIRONMENT	
CLASS 4 SEWAGE SYSTEMS	
TYPICAL SMALL SEPTIC TANK SYSTEM	
SCALE : NOT TO SCALE	
DRAWN BY : L.L.B.	DATE : DEC. 1981
CHECKED BY : D.S.	DRAWING NO. 9.1.1

Drawing No.2



MINISTRY OF THE ENVIRONMENT	
CLASS 4 SEWAGE SYSTEMS TYPICAL DETAILS– SMALL LEACHING BEDS	
SCALE N.T.S.	
DRAWN BY J.M.	DATE JAN. 1982
CHECKED BY R.A.W.	DRAWING NO. 8.1.1.

Drawing No. 3



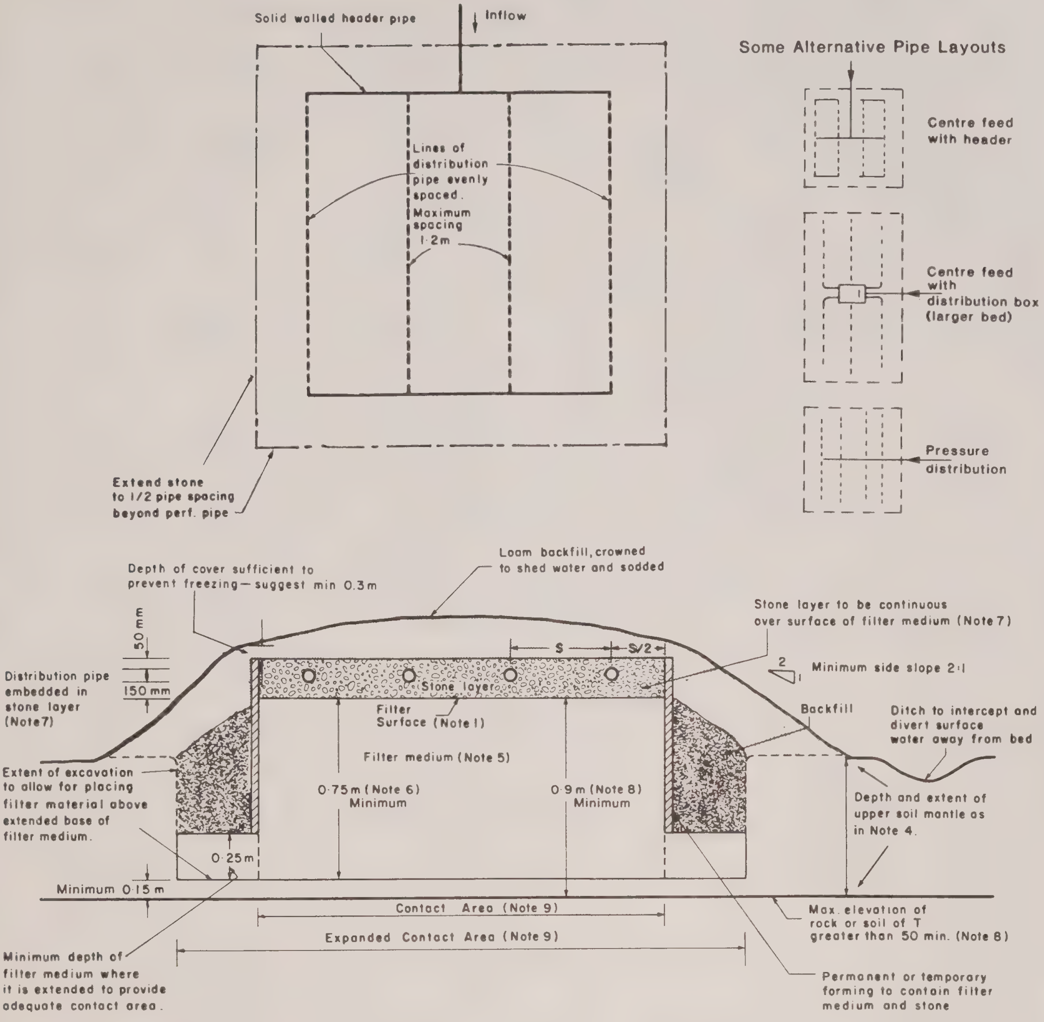
Plan and Profile – Typical Raised Bed

1. CLEARANCES FROM BUILDINGS, LOT LINES, WELLS, ETC., AS FOR NORMAL LEACHING BEDS PLUS 2 METRES HORIZONTAL FOR EACH 1 METRE VERTICAL THAT SURFACE OF BED IS ABOVE GRADE.
2. FILL SLOPE MUST BE STABLE FOR THE MATERIAL USED, BUT NOT STEEPER THAN 2 METRES HORIZONTAL TO 1 METRE VERTICAL.
3. PERCOLATION RATE "T" OF IMPORTED MATERIAL SHOULD PREFERABLY BE NOT LESS THAN 2 MIN/CM.
4. EFFLUENT PASSING THROUGH FILL MUST BE ABSORBED INTO NATURAL SOIL BENEATH THE FILL OR INTO THE SURROUNDING PERMEABLE SOIL WITHOUT PONDING OR BREAKOUT TO SURFACE. THE RELATIONSHIP BETWEEN THE PERCOLATION TIME OF THE FILL FORMING THE LEACHING BED AND THAT OF THE SOIL ON WHICH IT IS PLACED, AND THE REQUIREMENTS FOR A MINIMUM SOIL MANTLE FOR 15 METRES BEYOND THE OUTER PIPES IN ANY DIRECTION IN WHICH THE EFFLUENT FROM THE LEACHING BED MAY MOVE IN THE SOIL, ARE CONTAINED IN THE REGULATION AND ILLUSTRATED IN APPENDIX 8.4.1.
5. DETAILS OF ABSORPTION TRENCH CONSTRUCTION SAME AS IN DRAWING NO. 8.1.1.
6. WHERE SOIL MANTLE (NOTE 4) IS ABSENT, OR OF INADEQUATE DEPTH, SOIL MUST BE ADDED TO MEET THE REQUIREMENTS OF THE REGULATION. THIS MAY BE ADDED OVER AN AREA OR, WHERE THE TOPOGRAPHY IS UNEVEN, ONLY OVER THE ROUTES IN WHICH IT IS OBVIOUS THAT THE IN-GROUND MOVEMENT WILL TAKE PLACE.

MINISTRY OF THE ENVIRONMENT	
LEACHING BEDS	
TYPICAL LAYOUT — RAISED LEACHING BED	
SCALE: NOT TO SCALE	
DRAWN BY: C.D.M.	DATE: APRIL 1982
CHECKED BY: D.M.C.S.	DRAWING NO. 8.4.3 A

Drawing No. 4

TYPICAL SAND FILTER
(Adaptable for use with both class IV or class VI sewage system)



NOTES

Refer to O Reg 374/81 (Sec 10 and Sec 12) for regulations governing sand filter type Leaching beds.

1. Maximum area of filter surface 50 m^2.
2. Permissible loading on filters :
   Class IV sewage systems — 75 L/m^2/day for flows up to 3000 L/day.
   50 L/m^2/day for flows between 3000 L/day – 5000 L/day.
   Class VI sewage systems — 150 L/m^2/day for flows up to 6000 L/day.
   100 L/m^2 day for flows between 6000 L/day and 10,000 L/day.
3. The maximum daily sewage flow of a sewage system in which the leaching bed may be of the filter type is 5,000L for a class 4 sewage system and 10,000L for a class 6 sewage system. At maximum size in each case two 50 m^2 filters are required.
4. A soil mantle of T not greater than 15 min/cm and at least 0.25m in depth is required to extend at least 15m beyond the outer distribution pipes in any direction in which the effluent from the bed will move laterally. It must be added if the soil in or on which the filter bed is to be constructed has a T value exceeding 15 min/cm.
5. Only filter material meeting grading requirements acceptable to the Ministry of the Environment may be used.
6. Minimum depth of specified filter material 0.75m.
7. Pipe to be bedded in stone that is either 19 mm clear aggregate washed to be free of fine material, or clean gravel screened to be between 19 and 53 mm in size.
8. Surface of sand filter material to which sewage is applied must be a minimum of 0·9m above rock or soil of T greater than 50 minutes/cm and at least 0·5 m above the high groundwater table.
9. Contact area between the filter medium and the underlying soil must not be less than the area A = QT/850 where Q is the daily sewage flow in litres and T is the percolation time of the underlying soil.

MINISTRY OF THE ENVIRONMENT	
LEACHING BEDS	
TYPICAL SAND FILTER	
SCALE : NOT TO SCALE	
DRAWN BY : L.L.B.	DATE :
CHECKED BY : D.S.	DRAWING No : 8.5.1

CARE & MAINTENANCE OF A SEWAGE SYSTEM

Warning: *Under no circumstances should a homeowner enter a septic tank. Noxious gases which are heavier than air remain in the tank after the top is removed, and have caused death both to the original victim and to those who attempt to rescue him from the tank.*

A septic tank and tile bed should, with proper care and maintenance, provide many years of service. There are, however, some things which you, the homeowner should be aware of that will help the system to function properly. These are:

1. Do not allow roof drains to discharge to the septic tank or surface waters to drain towards the area of the leaching bed.
2. Water usage in the home should be kept to a minimum. If automatic washers and dishwashers are used make sure full loads are washed each time. Excessive use of water (such as doing numerous washings in one day) could flush solids from tank to the leaching bed.
3. Moderate use of household drain solvents, cleaners, disinfectants, etc., should not interfere with the operation of the sewage disposal system, however, indiscriminate use may cause problems.
4. There should be no need to use "starters", "bacterial feeds" or "cleaners".
5. If roots penetrate and plug the tile, two or three pounds of copper sulphate crystals flushed down the toilet once a year should kill the roots it contacts. However, the use of copper sulphate should be carefully supervised since it may corrode chrome, iron and brass. Cast iron is not significantly affected. The crystals, when used in the above manner, should not disrupt the operation of the septic tank.
6. The septic tank should be inspected at least once every two years and the tank pumped out when necessary —every three or four years is suggested. Failure to pump-out a septic tank when required may result in sludge or scum being carried over to the leaching bed resulting in soil clogging and complete failure of the system.
7. Vehicular traffic (including snowmobiles) should not be allowed over the leaching bed.
8. The area over a leaching bed should have a good cover of grass but shrubs or trees should not be planted over the area. Good ventilation and adequate sunlight should be maintained in the area of the leaching bed.

IN THE INTEREST OF HEALTH AND THE PROTECTION OF THE ENVIRONMENT, ANY MALFUNCTION OF A SEPTIC TANK SHOULD BE PROMPTLY REPORTED TO THE LOCAL HEALTH UNIT OR MINISTRY OF ENVIRONMENT OFFICE.

Septic Tank Maintenance Record

Date	Nature of work [pumped out, general inspection, remedial work (specify)]	Name of company and person carrying out the work or inspection

FACTS

Ministry of the Environment
Ontario
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

January 28, 1986

DIOXIN
BACKGROUND

What are PCDDs and PCDFs

The terms dioxin and furans refer to families of 75 related chemical compounds known as polychlorinated dibenzo-p-dioxins (PCDDs) and 135 related chemical compounds known as polychlorinated dibenzofurans (PCDFs) respectively.

These two families of compounds possess similar chemical structures, patterns of toxic and biological responses and may share a common mechanism of action at the cellular level.

The most toxic forms of PCDDs and PCDFs are those containing 4-6 chlorine atoms, with four of the chlorine atoms at the lateral positions, i.e., 2, 3, 7 and 8.

The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) is the most toxic of all the PCDDs and PCDFs.

Octachlorodioxin is one of the least toxic forms of dioxin. The 2,3,7,8-T_4CDD dioxin, for example, is estimated to be 10,000 times more toxic than octadioxin. The octa form of dioxin is also among the most common. It can be produced through the incomplete combustion of fossil fuels like coal, or even cigarettes.

These compounds are not intentionally made for any purpose; they are unavoidable by-products created in the manufacture of other chemicals such as some pesticides, or as a result of incomplete combustion of mixtures containing chlorine atoms and organic compounds.

Occurrence in Ontario

In Ontario, there is no current chemical manufacturing of 2,3,5-trichlorophenol, nor formulation of 2,4,5-T and 2,4-D herbicides or pentachlorophenol or hexachlorophenol chemicals with which PCDD and PCDF contamination has been associated.

Current sources of PCDDs and PCDFs in the Ontario environment include incineration processes, or the use of products which contain trace amounts of PCDDs and PCDFs.

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The PCDDs and PCDFs from these sources are usually complex mixtures. The 2,3,7,8-T_4CDD isomer is generally only a small per cent of the total PCDDs and PCDFs present. This is in contrast to the problem in the United States where, because of extensive chemical manufacturing and waste disposal, 2,3,7,8-T_4CDD is a serious environmental contaminant.

Analyses carried out by Health and Welfare Canada on PCDD and PCDF residues in tissues of deceased and living persons, indicate body burdens of some PCDD and PCDF isomers in the majority of the samples analyzed. These results suggest that PCDDs and PCDFs are ubiquitous at low levels in the Ontario environment.

The first year that MOE had the capability to detect parts per quadrillion levels of dioxin was 1983. Octachlorodioxin was detected that year in raw untreated water samples taken from the Lakeview and St. Catharines water treatment plants.

Octachlorodioxin has also been detected at minute but measurable levels in the occasional raw water sample from the St. Clair River area.

Based on extensive reviews of the literature on the toxicology of PCDDs and PCDFs, the following conclusions and recommendations have been reached:

<u>Sources and Exposure</u>

In order of decreasing contribution to the Ontario environment, the sources have been identified as:

i) combustion sources including municipal refuse and sewage sludge incineration;

ii) use of chemical products such as chlorinated phenols; and,

iii) other sources such as transboundary water and air contamination, chemical wastes, commercial and domestic wastes, polychlorinated biphenyls (PCBs) and sewage.

Based on preliminary exposure assessment, the major routes of exposure in order of decreasing contribution appear to be;

i) ambient air in the vicinity of incineration sources;

ii) diet, mainly some sport fish from Lake Ontario;

iii) atmospheric PCDDs/PCDFs deposited on soil, mainly to children; and,

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iv) surface water - runoff from old chemical landfills and past discharge areas (river and lake sediments).

Recommended Maximum Allowable Daily Intake

Review of extensive toxicological data indicates that 2,3,7,8-T_4CDD is not a classical mutagen and appears to cause tumours in rodents by an indirect mechanism. The Ontario Scientific Advisory Committee concluded that a threshold exists for tumour incidence and consequently, 2,3,7,8-T_4CDD will not cause cancer in humans at levels below the threshold found in animal studies.

Based on reliable chronic animal studies and extensive but inconclusive human epidemiological data, the Committee recommended that a threshold-safety factor approach be used to develop a maximum allowable daily intake.

The proposed standard recommends an umbrella maximum allowable daily intake of 2,3,7,8-T_4CDD or its toxic equivalent from all exposure pathways based on no observable effect level from rodent cancer bioassays and an explicit safety factor of 100.

The recommended maximum allowable daily intake for 2,3,7,8-tetra-chlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) or its toxic equivalent of PCDDs and PCDFs is 10 picograms/kilogram of body weight/day for humans.

Interim Drinking Water Guideline

An interim guideline for dioxins and furans in drinking water has been developed by the Ministry of the Environment consultation with Health and Welfare Canada and the Provincial Ministries of Health and Labour based on the Scientific Criteria Document. The guideline based on an allocation of five per cent of the total allowable daily intake to drinking water using a 60 kilogram person consuming two litres of water per day.

The guideline for dioxins and furans other than 2,3,7,8-T_4CDD is calculated using numerical conversion factors to convert the equivalent concentration of the other less toxic PCDDs and PCDFs to a concentration which would exhibit a toxicity similar to 2,3,7,8-T_4CDD.

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PROPOSED IMAC FOR PCCDs AND PCDFs IN DRINKING WATER

Isomer Groups	Toxicity factor [1] relative to 2,3,7,8-T_4CDD	Proposed IMAC [2] (pg/L)
2,3,7,8-T_4CDD	1.0	15
M_1CDD	0.0001	150,000
D_2CDD	0.001	15,000
T_3CDD	0.01	1,500
T_4CDD*	0.01	1,500
P_5CDD	0.1	150
H_6CDD	0.1	150
H_7CDD	0.01	1,500
O_8CDD	0.0001	150,000
M_1CDF	0.0001	150,000
D_2CDF	0.001	15,000
T_3CDF	0.01	1,500
T_4CDF	0.5	30
P_5CDF	0.5	30
H_6CDF	0.1	150
H_7CDF	0.01	1,500
O_8CDF	0.0001	150,000

* excluding 2,3,7,8-T_4CDD

1. Table 3.6.7C (Scientific Criteria Document p. 3-129)

2. Based on 5% of the maximum allowable daily intake (10 pg/kg/day) for a 60 kg individual consuming 2 L/day.

The interim guideline will be reviewed as part of an ongoing federal-provincial effort to develop national standards for dioxins and furans from all environmental sources. The consideration of all routes of exposure is to ensure that the cumulative dose does not exceed the recommended allowable daily intake.

FACTS

Ministry of the Environment
Ontario
Hon. Jim Bradley
Minister
Rod McLeod,
Deputy Minister

ABOUT OPEN BURNING

Spring '86

Open fires cause air pollution. Their smoke and odors can aggravate respiratory conditions, soil property, reduce visibility and generally lessen enjoyment of property. In urban and suburban areas particularly, these effects can be intensified by a build-up of pollutants in the air. In rural areas, the effects are less noticeable.

If at all possible, do not open burn leaves, grass, stumps, fallen trees, trash, crop stubble and other materials.

There are other alternatives. Depending upon the nature of the materials involved, they can be buried, composted, set out for Municipal collection or taken directly to a local dump or sanitary landfill site.

If you must burn, follow these guidelines to keep your fire from becoming an air pollution problem. All air pollution complaints received by the Ontario Ministry of the Environment are investigated and corrective action can be taken under the Environmental Protection Act, 1971.

° Do not burn in urban or suburban areas.

° Burn only dry materials. Don't burn petroleum products, plastics, rubber or anything else that will cause excessive smoke or fumes.

° Keep fire at least 500 feet from a dwelling.

° Burn less than a cubic yard of material at a time.

° Stay with fire at all times.

° Don't burn on days when rain, fog, or any other weather condition prevents the ready dispersion of smoke.

° Check any local bylaws enforced by your fire or police department. if burning above Ontario's Fire Line, follow regulations enforced by the Ministry of Natural Resources. The Fire Line runs east from Lake Huron across the bottom of Georgian Bay and the top of Lake Simcoe down to Gananoque, then north and west to meet the Ottawa River north of Renfrew.

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For further information regarding open burning, contact the nearest regional or district office of Environment Ontario. Following are the addresses of the regional offices:

Northwest - 435 James Street South, Thunder Bay - 475-1205

Northeast - 199 Larch Street, Sudbury - 675-4501

Southeast - 133 Dalton Street, Kingston - 549-4000

Central - 7 Overlea Blvd., Toronto - 424-3000

West Central - 19 King Street West, Hamilton - 521-7652

Southwest - 985 Adelaide Street South, London - 661-2200

Head Office - 135 St. Clair Avenue West, Toronto - 965-1658

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FACTS

Ministry of the Environment
Ontario
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

October 20, 1986

SCIENTIFIC CRITERIA DOCUMENT FOR STANDARD DEVELOPMENT - POLYCHLORINATED DIBENZO-p-DIOXINS (DIOXINS) AND POLYCHLORINATED DIBENZOFURANS (FURANS)

BACKGROUND

A Ministry of the Environment staff committee was formed to develop the scientific basis for developing multi-media environmental standards. Medical advice was provided by the Ministry of Labour.

The Ontario Scientific Advisory Committee on Dioxins and Furans (OSAC) was appointed to provide technical direction and peer review. The committee was composed of world-renowned experts:

- Dr. E. Y. Spencer from the University of Western Ontario, Chairman;
- Dr. Otto Hutzinger, University of Bayreuth, Germany;
- Dr. G. L. Plaa, University de Montreal;
- Dr. Stephen Safe, Texas A and M University.

The result was the Scientific Criteria Document of 536 pages which reviewed:

- toxicology of this group of compounds;
- their sources;
- possible exposure pathways in Ontario.

MAJOR CONCLUSIONS AND RECOMMENDATIONS

What are PCDDs and PCDFs

The terms dioxin and furans refer to families of 75 related chemical compounds known as polychlorinated dibenzo-p-dioxins (dioxins) and 135 related chemical compounds known as polychlorinated dibenzofurans (furans) respectively.

These two families of compounds possess similar chemical structures, patterns of toxic and biological responses and may share a common mechanism of action at the cellular level. Therefore, they are being dealt with as a group for the purposes of development of environmental standards.

The most toxic forms of dioxins and furans are those containing 4-6 chlorine atoms, with four of the chlorine atoms at the lateral positions, i.e., 2, 3, 7 and 8.

The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) is the most toxic of all the dioxins and furans.

...2/

These compounds are not intentionally made for any purpose; they are unavoidable by-products created in the manufacture of other chemicals such as some pesticides, or as a result of incomplete combustion of mixtures containing chlorine atoms and organic compounds.

Occurrence in Ontario

In Ontario, there is no current chemical manufacturing of 2,4,5-trichlorophenol, nor formulation of 2,4,5-T and 2,4-D herbicides or pentachlorophenol or hexachlorophenol chemicals with which dioxins and furans contamination has been associated.

Current sources of dioxins and furans in the Ontario environment are from incineration processes or the use of products which contain trace amounts of dioxins and furans.

The dioxins and furans from these sources are usually complex mixtures. The 2,3,7,8-T_4CDD isomer is generally only a small per cent of the total dioxins and furans present. This is in contrast to the problem in the United States where because of extensive chemical manufacturing and waste disposal, 2,3,7,8-T_4CDD is a serious environmental contaminant.

Analyses carried out by Health and Welfare Canada on dioxin and furan residues in tissues of deceased and living persons, indicate body burdens of some dioxin and furan isomers in the majority of the samples analyzed. These results suggest that dioxins and furans are ubiquitous at low levels in the Ontario environment.

Based on extensive reviews of the literature on the toxicology of dioxins and furans, the following conclusions and recommendations have been reached:

(a) Sources and Exposure
The document reviews extensively the current sources of dioxins and furans in Ontario based first upon analytical data from Ontario and where this is absent, upon extrapolation from other Canadian or international data. In order of decreasing contribution to the Ontario environment, the sources have been identified as:

i) combustion sources including municipal refuse and sewage sludge incineration;

ii) use of chemical products such as chlorinated phenols; and,

iii) other sources such as transboundary water and air contamination, chemical wastes, commercial and domestic wastes, polychlorinated biphenyls (PCBs) and sewage.

Based on preliminary exposure assessment the major routes of exposure in order of decreasing contribution appear to be:

i) ambient air in the vicinity of incineration sources;

ii) diet, mainly some sport fish from Lake Ontario;

iii) atmospheric dioxins/furans deposited on soil, mainly to children; and,

iv) surface water - only very low levels of dioxins or furans have been found in a few samples of finished drinking water in Ontario.

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(b) DIOXIN and FURAN Toxic Equivalent Factors

The report recommends the use of numerical conversion factors to convert the toxic concentrations of other dioxin and furan congeners to equivalent concentrations of 2,3,7,8-T_4CDD which would exhibit similar toxicity.

2,3,7,8-T_4CDD comprises a very small percentage of dioxin and furan isomers found in Ontario environmental samples.

Ontario environmental samples contain complex mixtures of dioxin and furan isomers.

There is only sufficient toxicological data for 2,3,7,8-T_4CDD (the most toxic and most studied isomer) for standard development.

The time required to accumulate suitable toxicological data on other isomers may run into decades. The apparent toxic potency relationships of other dioxins and furans to 2,3,7,8-T_4CDD is proposed.

(c) Recommended Maximum Allowable Daily Intake

Review of extensive toxicological data indicates that 2,3,7,8-T_4CDD is not a classical mutagen and appears to cause tumours in rodents by an indirect mechanism. The staff committee and the Ontario Scientific Advisory Committee concluded that a threshold exists for tumour incidence and consequently 2,3,7,8-T_4CDD will not cause cancer in humans at levels below the threshold found in animal studies.

Based on reliable chronic animal studies and extensive but inconclusive human epidemiological data, it is recommended that a threshold-safety factor approach be used to develop a maximum allowable daily intake.

The proposed standard recommends an umbrella maximum allowable daily intake of 2,3,7,8-T_4CDD or its toxic equivalent from all exposure pathways based on no observable effect level from rodent cancer bioassays and an explicit safety factor of 100.

The recommended maximum allowable daily intake for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) or its toxic equivalent of dioxins and furans is 10 picograms/kilogram of body weight/day for humans.

Copies of the document are available from:

Hazardous Contaminants Branch
Ministry of the Environment
135 St. Clair Ave. W.,
Toronto, Ontario
M4V 1P5

(416) 907-1193

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FACTS

Ministry of the Environment

Ontario

Jim Bradley
Minister

Spring, 1988

ONTARIO'S ENVIRONMENTAL LEGISLATION

The Ontario Ministry of the Environment was established in 1972 to consolidate responsibility for all aspects of environmental protection, enhancement and restoration under one provincial government agency.

The consolidation involved two government agencies, the Department of the Environment and the Ontario Water Resources Commission, with the new Ministry inheriting the operating legislation from each of its predecessors.

THE ENVIRONMENTAL PROTECTION ACT, 1971

The general provisions of this Act cover all types of pollution, forbidding the discharge of any contaminant to the natural environment in amounts, concentrations or levels exceeding those prescribed by regulation. The definition of contaminant includes a solid, gas, liquid, odour, heat, sound, vibration, radiation or combination of any of these, resulting directly or indirectly from the activities of man, which may cause injury to humans, flora or fauna.

In addition to regulated limits for specific contaminants, the Act prohibits any discharge that is likely to impair the natural environment, injure or damage plant or animal life, cause harm or discomfort to any person, affect the health or safety of any person or render any property, plant or animal life unfit for use by man.

The Act authorizes the Ministry's designated provincial officers to enter and inspect properties to investigate potential sources of pollution. Pollution abatement equipment may be installed on a voluntary basis by the owner of a pollution source or the owner's abatement measures may be formalized by the submission, to the Ministry, of a control program to prevent or reduce and control the emission of a contaminant. It also authorizes a director of the Ministry to issue control orders requiring specific abatement measures for the protection of the environment or human health or requiring the owner to take whatever measures are required to stop the emission of a contaminant, up to and including the suspension of plant operations.

Anyone proposing any project which would emit excessive contaminants to the environment is required to apply for and secure a certificate of approval and to install any required pollution control measures before operations can commence.

Various provisions of the Act cover air pollution control, including automotive emissions, the control and certification of waste handling and disposal systems and sites and the inspection and certification of private sewage systems by the Ministry. Amendments were made to the Act in 1975 to provide legislative authority for municipal noise control bylaws.

THE ONTARIO WATER RESOURCES ACT

This Act gives the Ministry of the Environment extensive powers to regulate water supply, sewage disposal and the control of water pollution. It authorizes the Ministry to supervise and examine all surface waters and ground waters in Ontario, to determine the extent, nature and causes of contamination in these waters.

Under the OWR Act, any discharge into a body of water, on its shore or in any place that may impair the quality of the water is an offence. It is also an offence to make any discharge which directly or through a derivative causes injury to a person, animal or bird through the use or consumption of any plant, fish or other living matter in the water.

Certificates of approval and installation of any required pollution controls are necessary for any persons, industries or municipalities drawing from a body of water or discharging waste into it.

The Ministry can construct and operate water waste treatment facilities, or it can require an industry or municipality to construct and operate approved facilities.

Water quality criteria have been established as acceptable standards for the various uses made of water.

ENVIRONMENTAL ASSESSMENT ACT, 1975

This Act provides for the assessment of any proposed major undertaking, governmental, municipal or private, at the very earliest stage to permit alteration or even cancellation of the undertaking should it be environmentally unacceptable. It also provides for full public participation in the decision-making process. It is being implemented in stages, applying first to major provincial undertakings. Specific private projects which involve significant environmental effects may be designated for assessment.

Under the Act, any proponent of an undertaking submits to the Ministry an environmental assessment on the proposal. All interested parties are given an opportunity to examine this document and may request that a public hearing be called by the Environmental Assessment Board to be established under the Act.

The Minister of the Environment, at his discretion, may deny any such request if he considers it to be frivolous, vexatious or that hearings would cause unnecessary delay to an environmentally acceptable undertaking.

The Environmental Assessment Board has decision-making powers when public hearings are held. The Minister and Cabinet serve as final arbiters of the Board's decisions.

THE PESTICIDES ACT, 1973

This legislation restricts the storage, distribution, sale and use of pesticides. The Ministry examines and licences professional exterminators and maintains a classification system to ensure that hazardous chemical pesticides are not handled or used by unqualified persons.

THE CONSOLIDATED HEARINGS ACT, 1981

With the beginning of the application of the Environmental Assessment Act to significant municipal project, one of the main concerns raised by the municipalities was the present planning and approval processes required, especially under The Planning Act and the Ontario Municipal Board Act. This act provides a streamlined approval process for municipal, private and provincial projects or proposed activities which may otherwise require hearings by more than one tribunal. Hearings under the act are conducted by one or more members of the Ontario Municipal Board, The Environmental Assessment Board or both as chosen by the chairmen of the two boards. The streamlining of hearing under this act is aimed at avoiding the possibility of repetitive, expensive, complex and time-consuming approval procedures.

THE ONTARIO WASTE MANAGEMENT CORP. ACT, 1981

This act established the Ontario Waste Management Corporation with powers to provide, develop and manage facilities for the treatment and disposal of liquid and hazardous waste generated by industry. The powers of the corporation include a mandate to encourage recycling and reduction of these wastes at their industrial sources.

FACTS

Ontario

Environment
Ontario
Jim Bradley, Minister

Summer 1988

THE COMPREHENSIVE FUNDING PROGRAM FOR WASTE MANAGEMENT FACTS FOR MUNICIPALITIES

The Comprehensive Funding Program

In June, 1987, the Ontario Government announced its Comprehensive Funding Program (CFP) for waste management. This new program provides financial assistance to municipalities and to the private sector for waste management activities. These activities include treatment and disposal facilities and initiatives under the 4Rs program - (Reduction, Reuse, Recycling, Recovery).

The 4Rs Program

For the 4Rs Program the following assistance is now available to municipalities and industries:

1) There will be increased emphasis on the present Municipal Recycling Support Program (MRSP) that provides funds to assist municipalities to initiate recycling programs. Criteria for this existing program will remain the same. (These details were previously distributed to municipalities, recyclers and other interested parties).

2) A new program is now available to assist municipalities in establishing facilities for recovering materials from mixed solid waste, or for processing these wastes into useful products such as fuel or compost. The maximum level of funding available for capital facilities is one third of the in-service capital costs. For research, development and demonstration, the level of funding is up to 100 per cent of the projected cost for a defined time period necessary to evaluate the proposal.

3) A new reduction/reuse program has been introduced to assist municipalities, the private sector or others to implement projects aimed at altering consumer waste-generation behaviour, or help consumers reduce the amount of waste requiring treatment/disposal. This program covers home composting, packaging, new product approaches, etc.

   Proponents may receive up to 50 per cent of promotional costs and up to 50 per cent of capital costs incurred by municipalities. Development of creative materials, such as educational pamphlets, will be funded up to 100 per cent - to a limit of $25,000 per project.

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4) A new program is also available to provide assistance for industries to take advantage of new opportunities for waste reduction. This new program will cover not only the management of industrial wastes, but will also explore opportunities for their beneficial use, and their reduction at a specific source or within a general industrial sector. Note: Funding under this component is not available to municipalities.

Treatment and Disposal

For the treatment/disposal areas, there are three initiatives now available, aimed principally at municipalities.

1) A new Financial Assistance Program (FAP) has been introduced to provide assistance to municipalities for establishing or expanding landfill sites, transfer stations, and processing facilities. The FAP program has an initial budget of approximately $1 million, projected to increase to $8 million by the fourth year.

   This new Financial Assistance Program will provide much-needed help for developing necessary waste management facilities - particularly for small municipalities with a low tax base.

2) There will be increased emphasis on the present Waste Management Improvement Program (WMIP) that provides funds for municipalities to upgrade existing sites, close sites, and to do investigative studies and provide remedial measures at active sites. While the criteria for funding under this program remain the same, the budget has been significantly increased.

3) More funding will be provided under the existing Waste Management Master Plan Program (WMMP). This program provides funds to groups of municipalities for long-range (20-year) waste management planning. Funding will be provided for Master Plans that are completed to the level of detail required by the Environmental Assessment Act. This is an existing program with a major budget increase.

Eligible Activities - for Assistance Under the New FAP:

- Engineering design and consulting services
- Technical/hydrogeologic studies
- Hearing/approval costs (legal fees, witnesses, etc.)
- Public consultation costs
- Capital costs of construction, land, and equipment
- Retrofitting/expansion/extension of existing facilities

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Non-eligible Activities

- Operating and maintenance costs
- Transportation costs for waste collection
- Projects associated with private facilities - except where municipalities can demonstrate that technical or financial resources are not available to establish and operate a facility, and have requested the private sector to act on its behalf

Energy From Waste (EFW) facilities are not eligible under this new program. Financial assistance for EFW projects is available from the Ministry of Energy.

How to Apply

Municipalities may apply for 4Rs assistance through the ministry's Waste Management Branch. Assistance for treatment, processing and disposal facilities may be obtained by contacting the local Environment Ontario office and completing the appropriate forms. Applications for FAP and WMIP funding for disposal facilities will be selected on an environmental/health priority basis.

For 1987, applications for the Financial Assistance Program will be reviewed and funded as received. For following years, the deadline date for application will be November 30 of the preceding fiscal year. Note: For projects that are expected to be funded between April 1, 1988 and March 31, 1989, applications must be submitted by November 30, 1987.

Funding Levels

Population Size:	Grant Available:
Under 7,500	75 per cent
Groups of Municipalities	60 per cent
Over 7,500	50 per cent

For More Information

Environment Ontario, Waste Management Branch, Waste Reduction Section, (416) 323-5200

Environment Ontario Regional Offices:

Kingston ----- (613) 549-4000
London ------- (519) 661-2200
Sudbury ------ (705) 675-4501
Thunder Bay -- (807) 475-1205
Hamilton ----- (416) 521-7640
Toronto ------ (416) 424-3000

For information relating to industrial waste management assistance programs, refer to Fact Sheet LFS6, Summer 1988.

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FACTS

Environment Ontario
Jim Bradley, Minister

Spring 1989

THE COMPREHENSIVE FUNDING PROGRAM FOR WASTE MANAGEMENT FACTS FOR MUNICIPALITIES

In June 1987, the Ontario Government announced its comprehensive funding program for waste management. The new program will provide municipalities and industries with financial assistance for reduction, reuse, recycling and recovery of wastes (the 4Rs) as well as new or improved municipal waste treatment/disposal facilities.

The 4Rs Program

For the 4Rs program, the following assistance is now available for both industries and municipalities:

- There will be increased emphasis on the present municipal recycling support program (MRSP) which provides funds to help municipalities initiate recycling programs. Criteria for this existing program will remain the same. (These details have been distributed to municipalities, recyclers and other interested parties).

- A new program is now available to assist municipalities in establishing facilities for recovering materials from mixed solid waste, or for processing these wastes into useful products such as fuel or compost. The maximum level of funding available for capital facilities is one third of the in-service capital costs. For research, development and demonstration, the level of funding is up to 100 per cent of the projected cost for a defined time period necessary to evaluate the proposal.

- A new reduction/reuse program has been introduced to assist municipalities, the private sector or others in implementing projects aimed at helping consumers reduce the amount of waste requiring treatment or disposal. This program includes home composting, packaging and new product approaches.

  Proponents may receive up to 50 per cent of promotional costs and up to 50 per cent of capital costs incurred by municipalities. Development of creative materials, such as educational pamphlets, will be funded up to 100 per cent--to a limit of $25,000 per project.

- A new program is also available to help industries take advantage of new opportunities for waste reduction. This program will not only cover the management of industrial wastes but will also explore opportunities for their beneficial use and reduction at a specific source or within a general industrial sector. Funding under this program is not available to municipalities.

Treatment and Disposal

For treatment and disposal, there are three new initiatives now available, aimed principally at municipalities:

- The new financial assistance program (FAP) will provide assistance to municipalities for developing new facilities or expanding existing facilities such as landfills, transfer stations and processing facilities.
- There will be an increased emphasis on the present waste management improvement program (WMIP) to upgrade or close existing municipal sites and to do investigative studies or provide remedial measures at active sites.
- There will also be an increased emphasis on the present waste management master plan (WMMP) program to assist municipalities or groups of municipalities in long-range waste management planning.

Eligible Activities for Assistance Under the New FAP

- Engineering design and consulting services
- Technical and hydrogeological studies
- Hearing and approval costs (legal fees, witnesses, etc.)
- Public consultation costs
- Capital costs of construction, land, equipment
- Retrofitting, expansion, extension of existing facilities

Ineligible Activities for Assistance Under the New FAP

- Operating and maintenance costs
- Transportation costs for waste collection
- Projects associated with private facilities, except where municipalities can demonstrate that technical or financial resources are not available to establish and operate a facility and have requested the private sector to act on its behalf
- Energy-from-waste (EFW) facilities (financial assistance for EFW projects is available from the Ministry of Energy.)

How to Apply

Municipalities may apply for program assistance through the ministry's Waste Management Branch. Assistance for treatment, processing and disposal facilities may be obtained by contacting the local Environment Ontario office and completing the appropriate forms. Applications for FAP and WMIP funding for disposal facilities will be selected on an environmental health priority basis. The deadline date for application will be November 30 of the preceding fiscal year.

Funding Levels

Population Size:	Grant Available:
Under 7,500	75 per cent
Groups of Municipalities	60 per cent
Over 7,500	50 per cent

For More Information

Contact Environment Ontario, Waste Management Branch, Waste Reduction Section, (416) 323-5200.

Environment Ontario regional offices:

Kingston : (613) 549-4000	London : (519) 661-2200
Hamilton : (416) 521-7640	Sudbury: (705) 675-4501
Thunder Bay: (807) 475-1205	Toronto: (416) 424-3000

FACTS

Environment Ontario
Jim Bradley, Minister

Spring 1989

ENVIRONMENT ONTARIO AND THE BLUE BOX

Recycling saves resources, energy and landfill space, even as it reduces the pollution associated with the production of new goods from raw materials. It is one of the 4Rs of waste management: reduce, reuse, recycle and recover.

Environment Ontario is committed to providing the infrastructure, technical expertise and financial assistance that will allow Ontario's people, institutions and businesses to adopt this environmentally and economically prudent approach to waste management.

Municipal Recycling Support Program

The curbside blue box has become the most visible symbol of recycling in Ontario. Funding for the start-up of each blue box project is shared jointly by the municipality, the soft drink industry and Environment Ontario through the municipal recycling support program (MRSP). The ministry spent $3.6 million on municipal recycling in 1986-87, $5.1 million in 1987-88 and committed $7.7 million towards municipal multimaterial recycling in the 1988-89 fiscal year.

Three years ago there were only seven municipalities with blue box curbside recycling projects in Ontario. Today, more than 110 names appear on the honor roll of municipalities with blue box recycling projects.

This year, more than 130,000 metric tonnes of paper, glass, metals and PET (polyethylene terephthalate) soft drink containers are being recycled through blue box projects. The ministry expects to surpass 170,000 tonnes next year.

Helping Students Recycle in their Classrooms

Schools are now also joining the recycling movement. In October, Environment Minister Jim Bradley announced a new school recycling program called Student Action for Recycling (STAR). The STAR program's pilot phase began in January 1989 in 16 schools in communities served by blue box curbside recycling projects. All schools in these communities are eligible to join the STAR program in its provincewide start-up in September 1989. The total cost of establishing school recycling across the province is estimated at $10 million and is expected to take several years to implement.

Beyond the Blue Box

The ministry is also helping to fund municipal recycling projects which go beyond the blue box program. In Guelph, for example, it funded a pilot recycling project involving 2,000 tenants in seven apartment buildings. It proved successful and is being implemented in every apartment building in the city. Also in Guelph, the ministry is supporting a demonstration project to evaluate a mechanical sorting machine designed to separate steel and aluminum cans, glass and two-litre PET plastic soft drink containers.

The ministry is also funding a pilot waste recovery project in Guelph to collect domestic and commercial organic waste material to produce a marketable compost. The results of the recovery project will be used to evaluate the feasibility of achieving a diversion of up to 30 per cent of the waste stream, as well as the effectiveness of implementing a full-scale, city-wide organic material recovery and composting system.

The ministry's Waste Management Branch also provides technical assistance in market development for recovered and recycled products.

Industrial 4Rs

Household waste represents about half of the total waste stream going into municipal landfills. The other half comes from commercial/industrial material collected by private waste haulers.

Through the ministry's industrial 4Rs program, the ministry provides financial and technical assistance to industries for developing sound waste management systems based on the 4Rs approach. In 1988, funding for industrial 4Rs initiatives was doubled to $2.5 million. Financial assistance has been committed to 50 projects in a variety of industries including rubber tires, wood, food processing, electroplating, cardboard and steel. A further 40 projects are under consideration.

For further information please contact:

Environment Ontario
Waste Management Branch
40 St. Clair Avenue West, 5th Floor
Toronto, Ontario
M4V 1M2
(416) 323-5195

FACTS

Environment Ontario
Jim Bradley, Minister

Summer 1989

ABOUT THE MUNICIPAL REDUCTION/REUSE PROGRAM

Introduction

Environment Ontario presents the Municipal Reduction/Reuse Program to encourage greater awareness of buying habits and products that will reduce waste production rates. The information below will assist proponents to apply for funding under this program. Additional information or clarification can be obtained from the Waste Management Branch of the ministry.

Background

Municipalities have the challenging responsibility of operating effective systems to collect and dispose of waste produced by residents and businesses. Public demand for environmental considerations, growth in waste quantities, and limited disposal site capacity, demand waste management strategies that are environmentally acceptable and reduce solid waste directed to landfill sites.

Environment Ontario promotes reduction and reuse of waste materials to meet this challenge. The Municipal Reduction/Reuse Program enhances other ministry policies and programs to encourage the development of sound waste management practices in Ontario.

Grants Available

Grants towards the capital, promotional and developmental costs of a proposal will be considered for funding.

Eligible Applicants

All municipalities, private sector organizations and individuals are eligible for projects aimed at reduction or reuse of waste materials that would otherwise be directed to municipal landfill. Capital projects will only be considered through municipalities.

Eligible Proposals

Assistance may be obtained for projects to alter consumer waste generating behavior or to reduce the amount of waste requiring treatment or disposal, for example, home composting, packaging, new product approaches.

Eligible Costs

Proponent may receive up to 50 per cent of promotional costs, and up to 50 per cent of capital costs incurred by municipalities. Development of creative materials or approaches (educational pamphlets, promotional programs) may be funded up to 100 per cent to a limit of $25,000 per project.

Ineligible Costs

Any projects eligible for funding under other government programs must be identified. Duplicate funding will not be considered.

Any expense previously incurred by the proponent will not be funded.

Application Procedure

- Applications for assistance should be made to the Waste Management Branch.

- Applicants will be assessed by the Waste Management Branch or by a committee drawn from that branch and regional operations personnel.

- Eligible proposals will be evaluated according to program criteria.

- A priority for funding consistent with availability of funds will be assigned.

- A contract/agreement will be negotiated where appropriate to cover requirements for recording, reporting, auditing, payment, public relations and termination.

- Initially, proposals will be evaluated and funded as received, however, in subsequent years proponents for municipal programs will be expected to apply for financial assistance before October 1st of the previous fiscal year.

Evaluation Factors

Applications will be evaluated based on the following factors:

- Compatibility with waste management master plan program for the municipality involved;
- Scope of project and potential for further application in Ontario;
- Impact on the quality and quantity of the municipal waste stream;
- Potential for implementation;
- Cost/benefit analysis;
- Technical and business competence of proponent.

Grant Payment

Payments will be made at agreed intervals with documentation.

FACTS

Environment
Ontario
Jim Bradley, Minister

Summer 1989

A COMPLETE CHAIN OF RESPONSIBILITY IN THE MANAGEMENT OF HAZARDOUS AND LIQUID INDUSTRIAL WASTES

Introduction

What are hazardous wastes? They can be anything from a used can of paint thinner to chemicals with long names like methyl ethyl ketone peroxide. They can be toxic, corrosive, or ignitable. They may be generated by an industry, a store or even in your home.

Whatever the waste, or wherever its source, one thing is certain: everyone has a degree of responsibility for its proper handling.

We demand cars, telephones and electrical appliances; we want weed-free lawns and wrinkle-free synthetic fabrics. By satisfying these desires, hazardous wastes may be produced.

All wastes, even non-hazardous wastes, are a cause for concern and as a society we must work toward reducing, reusing, recycling and recovering as much of our waste as possible. Realistically, of course, we will always be left with some waste requiring treatment or disposal.

The Ontario waste management regulation (Ontario Regulation 309) has been designed to help ensure that liquid industrial and hazardous wastes are handled with care. The regulation establishes responsibilities for waste generators, carriers and receivers that track wastes from the point of generation to either eventual recycling or final disposal.

The Manifest System

Generators, carriers and receivers of waste are tied together by the manifest system to provide a complete chain of responsibility. The manifest system was first introduced in 1977 and has undergone a number of modifications. The waste management regulation has incorporated some further changes and the system has now evolved into a very efficient tool, not only for the ministry, but also for the generators, carriers and receivers of liquid industrial and hazardous wastes.

The manifest consists of a six-part form that must be completed, for each load of waste, by the generator, carrier and receiver. It provides details about the waste, its origin and destination.

Manifest forms are provided only to carriers approved under the Environmental Protection Act. These carriers are responsible for having a supply on hand and using them as required for each shipment of waste. It is illegal for carriers to transport liquid industrial or hazardous wastes without having a completed manifest in the vehicle.

The generator, however, must indicate on the manifest form the initial action a driver should take in case of an accident or emergency. This information must include names and telephone numbers of the people who should be contacted if such an event should occur.

Copies of the manifest must be forwarded to the Waste Management Branch of the ministry by both the generator and receiver to allow the ministry to track every load of waste shipped in the province.

Generator Responsibilities

The key to wise waste management is a comprehensive monitoring and control program based on sound information.

Environment Ontario has developed a program that requires generators of waste to register with the ministry. Registration provides information to allow the ministry to develop a comprehensive profile of the wastes generated in Ontario. This profile is used as the basis for the entire waste management control system. The manifest provides the vital link to ensure that all types of waste, identified through waste registration, are properly transferred.

Under the regulation, all generators are required to assess their wastes according to specific criteria. These criteria are outlined in Regulation 309 and the "Registration Guidance Manual for Generators of Liquid Industrial and Hazardous Wastes". If the wastes are found to be subject to the regulation, after this assessment, then the company and the waste(s) must be registered with Environment Ontario. The generator must enter the generator registration number assigned by the ministry on the manifest.

Generators must ensure that the carrier they use is operating under a valid Certificate of Approval issued by the ministry, and uses a manifest for each waste transaction. Prior to each transaction, the generator must identify the intended receiving facility on the manifest form obtained from the carrier. If, for any reason, the waste is refused by the receiving facility designated on the manifest, the generator is responsible for either finding an alternative disposal facility or taking back the waste.

The sixth copy of the manifest is to be returned by the receiver to the generator within three days of waste receipt. If the copy is not received within two weeks from the original transaction, the generator should follow up. After four weeks, if the disposition of the waste cannot be determined, the ministry must be notified by the generator. It is the generator's responsiblity to make sure that each load of waste generated has been received at an approved site.

Carrier Responsibilities

The carriers of liquid industrial and hazardous wastes hold an important position in the waste management field. With the manifest system, they tie together the various elements and activities in the handling of these wastes.

Only carriers operating with a valid Certificate of Approval issued by the ministry may transport liquid industrial or hazardous wastes. This certificate specifies the types of waste approved for transportation by the carrier and is to be kept in each vehicle that is part of the carrier's operations. To help generators and the ministry identify approved carriers, both the company's name and the Certificate of Approval number must be printed on the side of each vehicle.

The ministry will only issue a supply of manifest forms to approved carriers. At the time of waste collection, the carrier must complete the appropriate part of the manifest and give the form to the generator. The carrier must not accept the waste unless the generator completes the appropriate part of the manifest. The carrier must deliver the waste only to the intended receiver or alternative site, designated by the generator.

In addition to the above requirements, carriers must provide training for all drivers of vehicles used to transport hazardous and liquid industrial wastes.

Receiver Responsibilities

Since the early 1970s, waste receivers have had to operate under a ministry issued Certificate of Approval. The classes of wastes approved for reception at the facility are specified on the face of the certificate.

When each load of waste is delivered to a receiving facility, the receiver must check to ensure that the waste is in fact the same waste identified on the manifest. Following a positive identification, the class of waste on the manifest must be compared to the receiver's Certificate of Approval. Wastes must be rejected if the waste class is not included on the certificate. For every load that is rejected, the receiver must file a written refusal report with the ministry identifying the generator, carrier, manifest and reason for refusal.

Upon waste receipt, the receiver must complete the manifest form provided by the carrier and mail the third copy to the ministry. The sixth copy must be returned by the receiver to the generator to provide confirmation that the waste has been received at an approved facility.

Other Links in the Chain of Responsibility

Environment Ontario is also a part of the chain of responsibility. Our role is to monitor, to regulate and to generally oversee the waste management program for Ontario.

To meet the needs of this role, the ministry operates a computerized tracking system using the manifest. The computer contains profiles of every hazardous and liquid industrial waste generator, carrier and receiver in the province. Manifest copies received from the generator and receiver are automatically compared to each other and to the computer profiles and any irregularities identified. Any irregularity is subject to investigation by ministry staff.

As citizens of Ontario, you also have a role. Your involvement was sought through our blueprint for waste management public participation program, and hundreds of citizens and organizations responded by giving us valued opinions and ideas. These ideas helped to formulate the waste management regulation. We invite you to continue this involvement.

Liquid industrial and hazardous wastes do require special attention and the Ontario waste management regulation sees that it is provided. By tracking the waste from its origin to its final destination, we know that the environment and the people of Ontario are being well protected today and in the future.

Handle with care, that is what the waste management regulation is all about.

For further information contact:

Industrial Waste Management Unit
Waste Management Branch
40 St. Clair Avenue West
Toronto, Ontario
(416) 323-5200

FACTS

Environment
Ontario
Jim Bradley, Minister

Fall 1989

RECYCLING BENEFITS THE ENVIRONMENT

Every householder who separates recyclables from garbage contributes to the well-being of our natural environment. But how much can one household do?

- By recycling newspaper, the average household saves 1.5 trees every year.
- Because it takes less energy to produce goods from recycled materials than from raw resources, recycling the newspaper, glass, steel, aluminum and two-litre polyethylene terephthalate (PET) soft drink bottles from an average household saves about 407 kilowatt-hours of electricity every year. By way of comparison, the typical Ontario home uses about 1,000 kilowatt-hours of electricity annually.
- This 407 kilowatt-hour saving means a recycling household saves 4.7 kilograms of sulphur dioxide and nitrogen oxides from being emitted into the air by thermal electrical generating stations. These chemical substances cause acid rain.
- Recycling the material collected from the typical household saves nearly 0.3 cubic metres of landfill space every year.

With one million Ontario households recycling, the environmental and economic benefits multiply to impressive dimensions.

- Recyclers save 1.5 million trees or roughly 1,750 hectares of forest every year from being cut down.
- Recyclers conserve 407 million kilowatt-hours of electricity every year. This is sufficient to provide the electrical needs (excluding heating) of about 400,000 homes.
- Recyclers prevent 4,760 tonnes of acid-rain-causing sulphur dioxide and nitrogen oxides from being released into the atmosphere.
- 285,600 cubic metres of landfill space is saved every year, which is equivalent to the amount of landfill space that the city of Kitchener uses in a year.
- The use of recycled materials reduces the energy required for the production of steel and paper by more than half, and of aluminum by about 70 per cent. Using recycled glass or steel in a manufacturing process can reduce water consumption by about 50 per cent.

ENVIRONMENT INFORMATION - ENVIRONNEMENT

SPRING 1990 Environment Environnement Ontario 1990 PRINTEMPS

LAKE SIMCOE ENVIRONMENTAL MANAGEMENT STRATEGY

PURPOSE

The purpose of the five-year Lake Simcoe Environmental Management Strategy is to restore the water quality of Lake Simcoe so that it will support a naturally reproducing cold-water fishery.

THE PARTNERS

The strategy's partners are the ministries of the Environment, Natural Resources, Agriculture and Food and the Lake Simcoe Region Conservation Authority.

The conservation authority will co-ordinate the activities of the participants and the concerns of its member municipalities. (A conservation authority is supported by the Ontario government and the municipalities within its area of responsibility.)

THE MINISTRY OF THE ENVIRONMENT'S ROLE IN THE STRATEGY

The Ministry of the Environment will play a major role in regulating phosphorus discharges into Lake Simcoe, monitoring and researching ways to improve water quality.

The major sources of phosphorus in waterways are run-off from fertilized fields – fertilizers contain phosphorus – and discharges from municipal sewage treatment plants. Many household soaps, detergents and cleaning compounds contain phosphorus.

REGULATION

The Ministry of the Environment is committed to holding the line on the amount of phosphorus discharged into Lake Simcoe. To do this, the ministry will closely monitor municipal sewage treatment plants.

To date, ministry-imposed controls at the Barrie and Orillia plants, and the diversion of sewage from

STRATÉGIE DE GESTION ENVIRONNEMENTALE DU LAC SIMCOE

OBJET

La Stratégie de gestion environnementale du lac Simcoe, d'une durée de cinq ans, vise à restaurer la qualité de l'eau pour que le lac puisse soutenir une population de poissons d'eau fraîche.

LES PARTENAIRES

Y participent le ministère de l'Environnement, le ministère des Richesses naturelles, le ministère de l'Agriculture et de l'Alimentation et l'Office de protection de la nature de la région du lac Simcoe.

C'est l'office qui se charge de coordonner la mise en oeuvre de la stratégie et d'examiner les préoccupations des municipalités intéressées. (Un office de protection de la nature est subventionné par le gouvernement provincial et par les municipalités qui se trouvent sur son territoire.)

LE RÔLE DU MINISTÈRE DE L'ENVIRONNEMENT

Le ministère de l'Environnement joue un rôle de premier plan : réglementer les rejets de phosphore dans le lac Simcoe, surveiller la qualité de l'eau et chercher des moyens de l'améliorer.

La présence de phosphore dans un lac ou une rivière est souvent attribuable au lessivage des terres fertilisées (les engrais contiennent du phosphore) et aux déversements des usines d'épuration des eaux d'égout. Un grand nombre de savons, de détergents et d'agents de nettoyage renferment du phosphore.

LA RÉGLEMENTATION

Le ministère de l'Environnement s'est engagé à restreindre le volume des déversements de phosphore dans le lac Simcoe. Aussi surveillera-t-il de près les usines municipales d'épuration.

Newmarket and Aurora to the Duffin Creek sewage treatment plant east of Toronto, have cut phosphorus discharges from sewage treatment plants into the lake by more than 50 per cent.

In recent years, total phosphorus concentrations in Cooks Bay near Keswick have been more than 25 parts per billion (ppb) and in Kempenfelt Bay near Barrie have been more than 20 ppb. To avoid algae blooms, phosphorus concentrations should not exceed 20 ppb.

To hold this line, the ministry has told area municipalities that they must not increase their phosphorus discharges into Lake Simcoe. This means that municipalities must upgrade their sewage treatment plants to keep pace with residential, commercial and industrial growth.

RESEARCH

Phosphorus is one of the nutrients that plants, such as algae and weeds, need to grow. When a lake has a high level of phosphorus, algae and weeds proliferate. When they die, they sink to the bottom of the lake and decay. In the process, the decaying plants consume the oxygen that fish, such as lake trout – that prefer the cooler water often found in the deeper reaches of a lake – need to survive.

Ministry scientists are developing a computer-based model, which will help them predict how phosphorus, oxygen and plants will interact and the effect this will have on fish habitats. Ministry scientists will also use the model as a guide to regulate phosphorus discharges.

A similar approach was used with success by Canadian and American jurisdictions to reduce high phosphorus levels in Lake Erie.

MONITORING

Ministry scientists will also monitor the lake's health by examining other indicators such as phytoplankton – a small, suspended species of algae. The ministry will monitor the amount of phytoplankton present in four water intakes in the Lake Simcoe watershed area, Brechin, Beaverton, Keswick and Sutton.

Ministry scientists will also regularly test water quality at 10 stations in the open lake.

Furthermore, as most of the agricultural phosphorus flowing into Lake Simcoe comes from the heavily cultivated Holland River watershed, the ministry will monitor water quality at key points on the river's tributaries. Checking water quality in this area has revealed that the amount of phosphorus flowing out of the Holland Marsh dropped to 3.5 tonnes in 1987 from 11.5 tonnes in 1982.

Jusqu'ici, les rejets de phosphore de cette source ont diminué de plus de 50 % grâce aux contrôles qu'il a imposés aux usines de Barrie et d'Orillia, et à l'acheminement des eaux d'égout de Newmarket et d'Aurora vers l'usine de Duffin Creek, à l'est de Toronto.

Ces dernières années, la teneur en phosphore était supérieure à 0,025 milligramme par litre (mg/L) dans la baie Cook, près de Keswick, et à 0,02 mg/L dans la baie de Kempenfelt, près de Barrie. Pour prévenir la prolifération des algues, la concentration doit être maintenue en-deçà de 0,02 mg/L.

Face à cette situation, le ministère a sommé les municipalités de la région de ne pas augmenter leurs déversements de phosphore dans le lac Simcoe. Elles doivent ainsi moderniser leurs usines d'épuration en fonction de la croissance résidentielle, commerciale et industrielle.

LES RECHERCHES

Les chercheurs du ministère mettent actuellement au point un modèle informatisé qui permettra de prévoir les effets des déversements de phosphore sur le lac.

Le phosphore n'est pas toxique, mains les algues et autres plantes aquatiques en ont besoin pour se développer. Un lac qui contient beaucoup de phosphore contiendra donc plus d'algues. Celles-ci, quand elles meurent, coulent vers le fond où elles se décomposent et consomment l'oxygène indispensable à la survie de poissons comme la truite de lac, qui affectionnent les eaux fraîches des profondeurs.

Le modèle de simulation aidera les chercheurs du ministère à prédire les répercussions qu'aura le processus sur la faune et la flore du lac Simcoe. Le ministère se servira aussi du modèle comme moyen de contrôler les déversements de phosphore.

D'autres compétences canadiennes et américaines ont adopté une méthode similaire pour le lac Érié.

LA SURVEILLANCE

Les chercheurs du ministère vont également surveiller la santé du lac en examinant d'autres indicateurs, comme le phytoplancton, ensemble d'organismes végétaux de taille microscopique, dont ils contrôleront la quantité à quatre points de prélèvement du bassin versant du lac Simcoe : Brechin, Beaverton, Keswick et Sutton.

Les chercheurs analyseront aussi régulièrement la qualité de l'eau à dix stations dans le lac.

En outre, comme la charge de phosphore que reçoit le lac provient du bassin versant de la rivière Holland, le ministère va surveiller la qualité de l'eau à des points clés des affluents de cette rivière. On a observé que la quantité de phosphore à s'écouler du marais Holland avait baissé de 11,5 tonnes en 1982 à 3,5 tonnes en 1987.

Enfin, le ministère surveillera la qualité de l'eau d'autres rivières du bassin du lac Simcoe.

Finally, the ministry will monitor water quality in other rivers in the Lake Simcoe basin.

BACKGROUND

Until the mid-1970s, Lake Simcoe and the rivers and streams which drain into it, were considered by anglers to offer some of the best fishing in the province. But as the lake's water quality deteriorated, algae blooms became common, whitefish practically disappeared from the lake, and lake trout stopped reproducing.

In addition, Orillia was having problems with the taste and odor of its drinking water.

Tourists, resort operators and municipal employees complained to provincial ministries and the Lake Simcoe Regional Conservation Authority about Lake Simcoe's water quality. Government scientists said that high phosphorus levels caused the problems.

In response to the complaints, the Lake Simcoe Environmental Management Strategy was launched.

Between 1980 and 1985, the ministries of Natural Resources, Agriculture and Food and the conservation authority worked together to find the sources of phosphorus and the effects on the lake's health.

At the same time, Environment Ontario acted to reduce the amount of phosphorus discharged into the lake. Barrie and Orillia, for example, were required to upgrade their sewage treatment plants. Between 1981 and 1988, the two cities reduced the amount of phosphorus, which they discharged into the lake, by one-third to about eight metric tonnes a year. Also, sewage from Newmarket and Aurora was diverted to the Duffin Creek sewage treatment plant on Lake Ontario via the York-Durham trunk sewer – a large sewer running through the regional municipalities of York and Durham. This reduced the amount of phosphorus entering the lake by six metric tonnes a year.

The four ministries and the conservation authority produced a report calling for a co-ordinated five-year program to protect and improve the water quality of Lake Simcoe. This is the Lake Simcoe Environmental Management Strategy.

HISTORIQUE

Jusqu'au milieu des années 70, le lac Simcoe et ses affluents étaient très populaires auprès des amateurs de pêche de la province. Avec le développement des algues, cependant, le corégone a disparu et la truite de lac a cessé de se reproduire.

De plus, l'eau potable présentait des goût et des odeurs à Orillia.

Les touristes, les exploitants de centres de villégiature et les employés des municipalités se sont plaints de la qualité de l'eau du lac Simcoe aux ministères provinciaux et à l'office de protection de la nature de la région. Les chercheurs du gouvernement ont fait remarquer que la forte teneur en phosphore était à l'origine des problèmes.

C'est pour donner suite à ces plaintes que la Stratégie de gestion environnementale du lac Simcoe était créée. Le ministère de l'Environnement participe à cette dernière depuis le début.

Entre 1980 et 1985, le ministère des Richesses naturelles, le ministère de l'Agriculture et de l'Alimentation et l'office de protection de la nature ont collaboré pour repérer les sources de phosphore et déterminer leurs effets sur la santé du lac.

Parallèlement, ils ont pris des mesures pour réduire les apports de phosphore. Les municipalités de Barrie et d'Orillia, par exemple, ont été forcées de moderniser leurs usines d'épuration des eaux d'égout. Entre 1981 et 1988, les deux villes avaient réduit de huit tonnes métriques le volume de leurs déversements de phosphore. En outre, les eaux d'égout de Newmarket et d'Aurora, rejetées jusque-là dans le lac Simcoe, ont été réacheminées vers le lac Ontario au moyen du grand collecteur qui traverse les municipalités régionales de York et de Durham. En conséquence, six autres tonnes de phosphore n'étaient plus vidées dans le lac.

Enfin, par suite d'études réalisées, les quatres ministères intéressés et l'office de protection de la nature ont rédigé un rapport dans lequel ils demandaient l'établissement d'un programme quinquennal visant à protéger et à restaurer la qualité de l'eau du lac. Ainsi est née la Stratégie de gestion environnementale du lac Simcoe.

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SUMMER 1990

Ontario Environment Environnement

1990 ÉTÉ

THE PERMIT TO TAKE WATER PROGRAM

Ontario has an abundance of fresh water. But it is not for the taking – at least not without a permit.

Under the *Ontario Water Resources Act*, Environment Ontario has the authority to regulate the amount of water individuals may take from streams, rivers, lakes, ponds and reservoirs, as well as from groundwater sources. The ministry's program is called the Permit to Take Water Program. It is based on section 20 of the act and allows the ministry to settle complaints and to regulate the use of surface and groundwaters. Those who contravene the act are guilty of an offence and subject to a fine.

WHO NEEDS A PERMIT?

Under the act, individuals and corporations need a permit:

- to take more than 50,000 litres of water a day. That is approximately enough water to cover one-quarter of a hectare (half an acre) with two centimetres of water;
- to use water to irrigate pastures, commercial crops, golf courses and public parks, as well as to fill a pond used for recreation or to supply an aquaculture business;

You do not need a permit to draw water:

- for ordinary household use;
- to water livestock, poultry, lawns or home gardens; or
- to fight fires.

The permits are available free of charge.

The Permit to Take Water Program does not guarantee or allocate water to the user. The program does try to make sure that everybody has enough water. So, if taking water from a river, stream, lake, reservoir or groundwater source interferes with another established use for water, alters the esthetic quality or the

LE PROGRAMME DE RÉGLEMENTATION DES PRÉLÈVEMENTS D'EAU

L'Ontario jouit d'importantes réserves d'eau douce, mais nul ne peut y puiser comme bon lui semble, du moins non sans autorisation.

Aux termes de la *Loi sur les ressources en eau de l'Ontario*, le ministère de l'Environnement est investi du pouvoir de réglementer la quantité d'eau qu'une personne est en droit de prélever dans les rivières, les ruisseaux, les lacs, les réservoirs, les étangs et les nappes souterraines. Aussi le ministère a-t-il mis sur pied un programme de réglementation des prélèvements d'eau, qui découle de l'article 20 de la loi et qui lui permet de régler les litiges et de contrôler l'usage des eaux de surface et des eaux souterraines. Quiconque contrevient à cette loi commet une infraction et est passible d'une amende.

QUI DOIT FAIRE LA DEMANDE D'UN PERMIS?

En vertu de la loi, les personnes et les sociétés doivent se procurer un permis :

- pour prélever plus de 50 000 litres (10 000 gallons impériaux) d'eau par jour. Une telle quantité permettrait de couvrir de deux centimètres (trois quarts de pouce) d'eau un quart d'hectare ou un demi acre de territoire;
- pour irriguer les pâturages, les cultures commerciales, les terrains de golf et les parcs publics ou pour remplir un étang servant à des fins récréatives ou à approvisionner une entreprise aquicole.

Il n'est pas nécessaire de se procurer un permis pour prélever de l'eau destinée :

- à un simple usage domestique;
- à abreuver le bétail et la volaille, et à arroser les pelouses ou les jardins privés; ou
- à combattre un incendie.

Le permis est gratuit.

Le programme ne garantit ni n'alloue à l'utilisateur un approvisionnement en eau. Il veille uniquement à ce que l'approvisionnement soit suffisant

the natural function of the body of water or deprives neighbors of enough water to meet their minimum daily needs, the ministry may restrict or prohibit the taking of water authorized under the program. This restriction may also take effect when there is a drought.

FOR ADDITIONAL INFORMATION

For an application form or for additional information on the Permit to Take Water Program, please contact the nearest regional office of Environment Ontario.

Northwestern Region
Box 5000
435 James Street South
Thunder Bay, Ontario
P7C 5G6
(807)475-1205

Southeastern Region
Box 820
133 Dalton Street
Kingston, Ontario
K7L 4X6
(613)549-4000

West Central Region
119 King Street North
Hamilton, Ontario
L8P 4T9
(416)521-7640

Northeastern Region
199 Larch Street
Sudbury, Ontario
P3E 5P9
(705)675-4501

Central Region
7 Overlea Boulevard
Toronto, Ontario
M4H 1A8
(416)424-3000

Southwestern Region
985 Adelaide Street South
London, Ontario
N6E 1V3
(519)661-2200

pour subvenir aux besoins de tous. Par conséquent, si la prise d'eau dans une rivière, un ruisseau, un lac, un réservoir ou une nappe souterraine nuit à un autre usage établi, altère la qualité esthétique ou la fonction naturelle de la pièce d'eau ou bien empêche d'autres usagers d'obtenir une quantité suffisante d'eau pour leurs besoins quotidiens, le ministère peut limiter ou interdire le prélèvement autorisé en vertu du programme. Cette restriction peut également être appliquée en période de sécheresse.

POUR DE PLUS AMPLES RENSEIGNEMENTS

On trouvera dans le feuillet d'information intitulé « Renseignements sur le programme de réglementation des prélèvements d'eau » une foule de données sur la législation, le permis de prélèvement d'eau et les modalités d'obtention. Pour se procurer un exemplaire du feuillet, un formulaire de demande ou encore des précisions sur le programme, communiquer avec le bureau régional d'Environnement Ontario le plus proche.

Région du Nord-Ouest
C.P. 5000
435, rue James sud
Thunder Bay (Ontario)
P7C 5G6
(807) 475-1205

Région du Sud-Est
C.P. 820
133, rue Dalton
Kingston (Ontario)
K7L 4X6
(613) 549-4000

Région du Centre-Ouest
119, rue King nord
Hamilton (Ontario)
L8P 4T9
(416) 521-7640

Région du Nord-Est
199, rue Larch
Sudbury (Ontario)
P3E 5P9
(705) 675-4501

Région du Centre
7, boulevard Overlea
Toronto (Ontario)
M4H 1A8
(416) 424-3000

Région du Sud-Ouest
985, rue Adelaide sud
London (Ontario)
N6E 1V3
(519) 661-2200

PRINTED ON RECYCLED PAPER
IMPRIMÉ SUR DU PAPIER RECYCLÉ

PIBS 832b
08/91 5M

ENVIRONMENT INFORMATION - ENVIRONNEMENT

SUMMER 1990

Ontario Environment Environnement
Jim Bradley, Minister/ministre

1990 ÉTÉ

OBTAINING FINANCIAL SUPPORT FOR A HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM

BACKGROUND

Environment Ontario has been providing start-up grants to municipalities for Household Hazardous Waste (HHW) collection projects since April 1986. The HHW program is a means to reduce waste volumes generated by householders and to divert hazardous waste away from landfill and sewage systems. As of April 1, 1989, the terms of financial support provided by the ministry for HHW collection program have been revised.

Under the original HHW program, which expired on March 31, 1989, grants were provided to municipalities to set up and promote special waste days during which the public was given an opportunity to deliver certain household hazardous wastes to designated depots. These wastes mostly consisted of oil-based and latex paints, oils and solvents. They also included pesticides, medical compounds, batteries, propane cannisters, bleaches, and other corrosive and incendiary substances. Municipalities were eligible to receive grants for up to 50 per cent of the operating costs to a maximum of $10,000 per special waste-day project per year. In addition, selected promotional materials (i.e. pamphlets, posters and utility bill inserts) were provided without charge to municipalities.

The ministry continues to recognize that some financial assistance is desirable to continue the practice of special collection and disposal of household hazardous waste throughout Ontario. However, under a revised HHW program, the emphasis will be on linking the level of financial support to the proportion of certain wastes that are recycled or reclaimed.

THE NEW HOUSEHOLD HAZARDOUS WASTE PROGRAM

Accordingly, the ministry has modified its approach to providing financial support for HHW projects. Grants will continue to be provided in support of multi-material

SUBVENTIONS POUR LA COLLECTE DES DÉCHETS DOMESTIQUES DANGEREUX

HISTORIQUE

Depuis le mois d'avril 1986, Environnement Ontario offre des subventions aux municipalités désireuses d'organiser une collecte des déchets domestiques dangereux. Il vise ainsi à réduire le volume des ordures ménagères et à faire en sorte que les déchets dangereux n'aboutissent plus dans les décharges ou dans les réseaux d'égouts. En avril 1989, les modalités de l'aide financière ont été modifiées.

À l'origine, les subventions accordées en vertu du programme, qui a pris fin le 31 mars 1989, permettaient aux municipalités d'organiser des journées de collecte et d'en faire la publicité. Les jours en question, les gens pouvaient déposer certaines catégories de déchets domestiques dangereux à un endroit prévu à cette fin. Ces déchets se composaient essentiellement de peintures, d'huiles et de solvants. S'y ajoutaient les pesticides, les produits pharmaceutiques, les batteries, les boîtes à propane, les teintures et d'autres substances corrosives ou inflammables. Les municipalités étaient admissibles à une subvention pouvant atteindre 50 p. 100 des frais de fonctionnement, jusqu'à concurrence de 10 000 $ par collecte par année. En outre, le matériel publicitaire (dépliants, affiches et encarts à insérer avec les factures d'électricité ou de téléphone) leur était offert gratuitement.

Le ministère sait à quel point il est important d'offrir une certaine aide financière aux municipalités pour le ramassage et l'élimination des déchets dangereux. Or, cette aide, selon la nouvelle formule, sera proportionnelle au volume de déchets qui sont recyclés ou récupérés.

LA NOUVELLE FORMULE

En conséquence, le ministère a modifié son approche. Il accordera toujours des subventions pour les services de collecte, mais ceux-ci pourront prendre la forme soit de journées spéciales, soit de centres permanents, qui gagnent en popularité en raison de leur commodité.

collection projects, as under the original program. However, they will be available for projects established in either of two formats: as special waste day/weekends or as permanent depots, which are becoming more popular because of the increased disposal convenience offered to householders.

Promotional materials will also be provided to grant recipients without charge, as before.

Under the new HHW program, community associations and unorganized settlements, as well as municipalities, will be eligible for financial support.

To obtain financial support for either a special waste day/weekend, or a permanent depot, certain requirements must be fulfilled.

FUNDING FOR SPECIAL WASTE DAY/WEEKEND EVENTS

The amount of funding in one year for any special waste day/weekend event will be limited to 50 per cent of the incurred costs up to $5,000.

However, the funding amount can potentially increase by an additional maximum of $10,000 (for a total of $15,000) or a part of $10,000 equivalent to the proportion of collected volume of latex paint, oil-based paint and crankcase oil diverted from disposal to re-use and re-refining. In other words, the total grant will be calculated according to the following funding formula:

$$\$5,000 + \$10,000 \quad \frac{\text{Total volume of paint and oil recycled}}{\text{Total volume of paint and oil collected}}$$

Documentation supporting the reported recycling activity in support of a claim will be required or the grant will not exceed $5,000. Funding will apply only toward direct expenses of conducting a project and not to feasiblity studies or consultant's costs.

Eligible net expenses (after any revenues from service charges, sale to recycling firms, or other grants) include:

- disbursements to a commercial waste management company (including sorting, transportation and disposal);
- equipment capital expenditures or rental;
- collection site rental;
- insurance;
- promotion;
- utilities (electricity, water, etc.); and
- wages and benefits (if municipal staff involved).

In the case of large municipalities that may require several special waste day/weekend events to satisfy the needs of all population centres, each geographical location that serves distinctly different areas is eligible for funding, but only once per year.

Le matériel promotionnel, de même, sera offert sans frais aux municipalités subventionnées.

Une autre nouveauté : les associations communautaires et les secteurs non constitués en municipalité seront maintenant admissibles au programme.

Pour obtenir une subvention, certaines conditions doivent être réunies.

JOURNÉES DE COLLECTE

Le montant de l'aide ne pourra dépasser 50 p. 100 des frais en un an, jusqu'à concurrence de 5 000 $.

Toutefois, le maximum pourra passer à 15 000 $, soit 10 000 $ de plus, en proportion du volume de peintures et d'huiles à moteur qui sont réutilisées ou récupérées. Autrement dit, la subvention globale sera calculée comme suit :

$$5\,000 + 10\,000\ \$ \quad \frac{\text{Volume de peintures et d'huiles recyclées}}{\text{Volume de peintures et d'huiles ramassées}}$$

Des pièces justificatives devront accompagner la demande de remboursement; sinon, la subvention ne pourra dépasser 5 000 $. L'aide financière s'appliquera uniquement aux frais directs de la collecte, et non aux études de faisabilité ou aux services d'experts-conseils.

Les dépenses nettes admissibles (après déduction les revenus, comme les frais de service, le produit des ventes aux entreprises de recyclage et les autres subventions) sont les suivantes :

- les sommes versées à une société commerciale de gestion des déchets (notamment pour le triage, le transport et l'élimination);
- les frais d'achat ou de location de matériel;
- la location du point de ramassage;
- les primes d'assurance;
- les frais de publicité;
- les services publics (eau, électricité, etc.)
- les salaires et les avantages sociaux (si des employés de la municipalité sont affectés au service).

Dans le cas des grandes municipalités où il est impératif d'organiser plusieurs collectes spéciales pour répondre à tous les centres de population, chaque lieu géographique qui dessert des endroits distincts sera admissible à la subvention, mais une fois par année seulement.

Les petites municipalités ou les secteurs non constitués en municipalité du nord de l'Ontario auront parfois intérêt à se joindre à des municipalités environnantes et à partager proportionnellement les frais des collectes.

Small municipalities or unorganized settlements in Northern Ontario may wish to jointly promote special waste day/weekend events in co-operation with neighboring municipalities and share the costs on the basis of householder turnout.

FUNDING FOR PERMANENT DEPOTS

Municipalities that choose to establish permanent depots for HHW collection are also eligible for financial support for capital expenditures through the ministry's Financial Assistance Program (FAP).

The FAP provides assistance to municipalities for implementing new waste management facilities or to expand existing ones, such as landfill sites, transfer stations and processing centres, in order to handle household hazardous wastes.

Under the FAP, funding is committed for up to a five-year period based on a funding structure tied to the size of municipal population served.

STEPS TO OBTAIN FUNDING AND APPROVALS

1. Complete the HHW Collection Program application form (attached) and submit to:
Director's Office
Waste Management Branch
Environment Ontario
5th Floor
40 St. Clair Ave. W.
Toronto, Ont. M4V 1M2

2. Complete the application form for a Certificate of Approval to operate a hazardous waste collection/transfer site. Forms may be obtained from the nearest Environment Ontario Regional Office.

Allow up to two months for processing of the application.

3. Register as a waste generator:

In operating a waste transfer facility, a HHW grant recipient will be deemed to be a waste generator when these wastes are to be shipped for final treatment or disposal. Under Ontario Regulation 309, a HHW grant recipient must then register itself as a waste generator. A special procedure has be established for the HHW program only. HHW grant recipients should seek assistance from the appropriate Environment Ontario Regional Office.

Generator registration takes approximately two months to process and may be applied for at the same time as the Transfer Site Certificate of Approval, mentioned in step two above.

4. Upon completion of the project, submit a Request for Payment form. This form is automatically sent to you after your HHW project and funding has been approved.

CENTRES PERMANENTS

Les municipalités qui souhaitent établir un centre permanent de collecte sont également admissibles à une subvention dans le cadre du Programme d'aide financière.

Ce programme offre une aide pour la mise sur pied de nouvelles installations ou l'agrandissement d'installations existantes de gestion des déchets dangereux (décharges, stations de transfert et centres de traitement).

La subvention est accordée pour une période d'au plus cinq ans et le montant est lié à la taille de la population.

MARCHE À SUIVRE

1. Remplir la formule de demande de subvention en vertu du Programme de collecte des déchets domestiques dangereux, ci-jointe, et l'adresser au :
Bureau du directeur
Direction de la gestion des déchets
Environnement Ontario
5e étage
40, avenue St. Clair ouest
Toronto (Ontario) M4V 1M2

2. Remplir la formule de demande de certificat d'autorisation pour exploiter un lieu de collecte ou de transfert de déchets dangereux. On peut se procurer cette formule à n'importe quel bureau régional d'Environnement Ontario.

Prévoir jusqu'à deux mois pour le traitement de sa demande.

3. S'inscrire comme producteur de déchets.

L'exploitant d'une station de transfert sera considéré comme un producteur de déchets si les déchets qu'il reçoit doivent être transportés ailleurs pour être traités ou éliminés. Aux termes du Règlement 309 de l'Ontario, le récipiendaire d'une subvention doit alors s'inscrire comme producteur. Des modalités spéciales ont été établies pour le Programme de collecte des déchets domestiques dangereux. Demander conseil au bureau régional d'Environnement Ontario le plus proche.

La formule d'inscription prend environ deux mois à traiter. On peut l'acheminer en même temps que la demande de certificat d'autorisation (étape 2 ci-dessus).

4. Une fois les travaux terminés, soumettre la demande de paiement («Request for Payment»). Elle est envoyée automatiquement au demandeur dès l'approbation de la subvention.

FOR GENERAL INFORMATION

Public Information Centre
Environment Ontario
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

(416) 323-4321

RENSEIGNEMENTS D'ORDRE GÉNÉRAL

Centre d'information
Environnement Ontario
135, avenue St. Clair ouest
Toronto (Ontario) M4V 1P5

(416) 323-4321

HOUSEHOLD HAZARDOUS WASTE (HHW) COLLECTION PROGRAM APPLICATION FORM

NAME OF APPLICANT'S MUNICIPALITY/MUNICIPAL ASSOCIATION:

ADDRESS:

CONTACT PERSON: **TELEPHONE NO.: (   )**

POPULATION OF COMMUNITY SERVED ____________________

NUMBER OF HOUSEHOLDS SERVED ____________________

NUMBER OF INDIVIDUAL HHW COLLECTION PROGRAMS (i.e., SPECIAL WASTE DAY/WEEKEND EVENTS) PLANNED IN THE CURRENT MARCH-APRIL FISCAL YEAR:

DATE	LOCATION(S)
____________________	____________________
____________________	____________________
____________________	____________________

WHERE PERMANENT DEPOTS ARE OR WILL BE ESTABLISHED, WILL FINANCIAL ASSISTANCE ALSO BE REQUESTED FROM THE MINISTRY'S FINANCIAL ASSISTANCE PROGRAM (FAP) BY SEPARATE APPLICATION?

CURRENT HHW COLLECTION PROGRAMS THAT ARE ONGOING OR HAVE BEEN COMPLETED: (i.e., SPECIAL WASTE DAY/WEEKEND EVENTS AND/OR PERMANENT DEPOTS):

DATE	LOCATION(S)
____________________	____________________
____________________	____________________
____________________	____________________

OTHER SPECIAL WASTE COLLECTION INITIATIVES, IF ANY:

PLANS FOR APPLICATIONS TO RECEIVE OTHER SOURCES OF FUNDING, IF ANY:

FOR MINISTRY USE ONLY

DATE RECEIVED ______________________ APPROVAL ______________________

COMMENTS ____

FORMULE DE DEMANDE DE SUBVENTION EN VERTU DU PROGRAMME DE COLLECTE DES DÉCHETS DOMESTIQUES DANGEREUX

NOM DE LA MUNICIPALITÉ OU DE L'ASSOCIATION MUNICIPALE :

ADRESSE :

PERSONNE À DEMANDER : **N° DE TÉLÉPHONE : (   )**

POPULATION ____________________

NOMBRE DE MÉNAGES ____________________

NOMBRE DE COLLECTES (JOURNÉES SPÉCIALES, PAR EXEMPLE) QUE VOUS COMPTEZ ORGANISER AU COURS DE LA PRÉSENTE ANNÉE FINANCIÈRE, DE MARS À AVRIL :

DATE	LIEU
____________________	____________________
____________________	____________________
____________________	____________________

SI VOUS SONGEZ À AMÉNAGER UN DÉPÔT PERMANENT OU SI C'EST DÉJÀ FAIT, DEMANDEREZ-VOUS AUSSI UNE SUBVENTION EN VERTU DU PROGRAMME D'AIDE FINANCIÈRE DU MINISTÈRE?

PRÉCISEZ LES COLLECTES EN COURS OU TERMINÉES (JOURNÉE SPÉCIALE OU DÉPÔT PERMANENT) :

DATE	LIEU
____________________	____________________
____________________	____________________
____________________	____________________

AUTRES INITIATIVES SPÉCIALES DE COLLECTE DES DÉCHETS :

DEMANDES DE SUBVENTION QUE VOUS COMPTEZ PRÉSENTER AILLEURS :

À L'USAGE DU MINISTÈRE

DATE REÇUE ____________________ APPROBATION ____________________

COMMENTAIRES ____

ENVIRONMENT
INFORMATION
ENVIRONNEMENT

SUMMER 1990

Ontario Environment Environnement

1990 ÉTÉ

CLASS 1, 2 AND 3 SEWAGE SYSTEMS

INTRODUCTION

Most sewage from our municipalities is processed through public plants. However, where municipal sewage plants are not available, privately owned systems do the job. The legislation relating to such systems is contained in Part VII of the *Environmental Protection Act* and the standards for the sewage systems are provided in Ontario Regulation 374/81.

Many privately owned sewage systems treat and dispose of the sewage from building(s) served in a class 4 (septic tank) or class 6 (aerobic packaged treatment plant) sewage system. Together with the municipal plants these two systems treat and dispose of over 90 per cent of Ontario's sewage.

There are, however, situations where a simpler sewage disposal system may be adequate. These situations exist in temporarily occupied hunting cabins and cottages, or where the use of a class 4 sewage system is difficult, costly, or impractical for other reasons.

CLASSIFICATION

Simple sewage-disposal systems are classified as:

CLASS 1: Chemical toilets, incinerating toilets, recirculating toilets, self-contained portable toilets and all forms of privies including portable privies, earth pit privies, pail privies, privy vaults and composting toilet systems.
These are used only for the disposal of human body wastes.

CLASS 2: Leaching pits.
These are used only for the disposal of sewage other than body wastes.

CLASS 3: Cesspools.
These are used for the disposal of the contents of class 1 toilets or effluent from leaching beds constructed prior to April 16, 1974.

SYSTÈMES D'ÉVACUATION DES CLASSES 1, 2 ET 3

INTRODUCTION

La plupart des eaux usées sont traitées dans des installations municipales. Toutefois, lorsqu'il n'existe pas d'usine d'épuration, ce sont des systèmes d'évacuation privés qui font le travail. Ces systèmes sont régis par la Partie VII de la *Loi sur la protection de l'environnement*, et les normes applicables sont énoncées dans le Règlement 374/81 de l'Ontario.

Beaucoup de systèmes privés ont pour fonction de traiter et d'éliminer les eaux usées provenant de bâtiments desservis par un système de classe 4 (fosse septique) ou de classe 6 (traitement aérobie). Combinés aux usines municipales, les systèmes de ces deux catégories permettent de traiter et d'éliminer plus de 90 % des eaux usées de l'Ontario.

Il peut cependant exister des situations où un système d'évacuation plus simple suffit. Il s'agit, par exemple, des cabines de chasse et des chalets occupés de façon temporaire, ou des cas où l'emploi d'un système de classe 4 est difficile, coûteux ou impossible pour d'autres raisons.

CLASSIFICATION

Les systèmes d'évacuation simples se classent comme suit :

CLASSE 1 : Toilettes chimiques, à incinération, à système de recirculation, toilettes portatives autonomes et toutes les formes de latrines y compris les latrines transportables, à simple trou, à fosse fixe ou mobile, et toilettes à compost.
Elles servent uniquement à éliminer les déchets d'origine humaine.

CLASSE 2 : Puits absorbants.
Ils servent uniquement à l'élimination des déchets qui ne sont pas d'origine humaine.

CLASSE 3 : Puisards.
Ils servent à éliminer le contenu des toilettes de classe 1 ou les effluents provenant de lits d'épandage construits avant le 16 avril 1974.

DEFINITIONS

The term "sewage" means waste of domestic origin including body and other liquid wastes from showers, tubs, laundry facilities, washrooms and kitchen sinks. Collectively, these are called "grey water".

APPROVALS

A certificate of approval or use permit is not required for a class 1 sewage system. For class 2 and 3 sewage systems, a certificate of approval must be obtained before construction of the building begins. These can be obtained from the local health unit or, in a few areas, from the local Environment Ontario office.

Inspection of completed class 2 and class 3 sewage systems is not mandatory, nor is a use permit required. These systems, however, may be subject to inspection at any time after construction to confirm that they comply with the regulation.

LOCATION

The clearance distances for class 1, 2 and 3 sewage systems from various features such as wells, springs, bodies of water are given in Table 1 (page 5).

CLASS 1 SEWAGE SYSTEMS

An outline and general description of various class 1 toilets are given in figures 1 and 2 on page 6 and 7.

These systems are used only for the disposal of human body wastes, although chemicals used to mask odors may be added. Vegetables and other biodegradable matter may also be added to composting toilets in accordance with the manufacturer's instructions.

Waterborne sewage, or grey water, cannot be disposed of in a class 1 sewage system. Class 1 sewage systems are approved only if another system is provided to handle the grey water. This second system is commonly a class 2 sewage system leaching pit.

The use of a class 1 and class 2 sewage system with new construction is generally discouraged. Because of the limited capacity of the class 2 sewage system, this combination usually will not provide for the full development of the dwelling served. The combination may be approved where the water use is minimal, such as where water is hand pumped or the pressure water system serves a limited number of fixtures such as the kitchen sink and a hand basin (see more on class 2 sewage systems below).

A class 1 sewage system may be a viable alternative to the expansion of an overloaded septic tank system. By using a class 1 sewage system the overall sewage flow from the house to the septic tank may be

DÉFINITIONS

L'expression « eaux usées » désigne l'ensemble des déchets domestiques, y compris les excréments et autres déchets liquides provenant des douches, baignoires, machines à laver, cabinets de toilettes et éviers. On parle aussi d'« eaux grises » ou d'« eaux ménagères ».

AUTORISATIONS

Aucun certificat d'autorisation ou permis d'utilisation n'est exigé pour les systèmes de classe 1. En ce qui concerne les systèmes de classe 2 ou 3, on doit détenir un certificat d'autorisation avant d'en commencer l'installation. Ce certificat peut s'obtenir auprès du service local de santé publique ou, dans quelques endroits, au bureau régional du Environnement Ontario.

L'inspection des systèmes de classe 2 et 3 terminés n'est pas obligatoire, pas plus que l'obtention d'un permis d'utilisation. Toutefois, une fois construits, ces systèmes peuvent faire l'objet d'une inspection qui permet de vérifier s'ils sont conformes au règlement.

EMPLACEMENT

On trouvera au tableau 1 (page 6) les espacements à respecter entre les systèmes d'évacuation des classes 1, 2 et 3 et divers éléments tels que puits, sources et cours d'eau.

SYSTÈMES D'ÉVACUATION DE CLASSE 1

Un résumé et une description générale des diverses toilettes de classe 1 sont présentés aux figures 1 et 2 des pages 7 et 8.

Ces systèmes sont utilisés uniquement pour éliminer des déchets d'origine humaine, bien que l'on puisse y ajouter des produits chimiques pour absorber les odeurs. Il est aussi possible de jeter des légumes et d'autres produits biodégradables dans les toilettes à compost, sous réserve des instructions du fabricant.

Les déchets liquides, ou eaux ménagères, ne peuvent être éliminés à l'aide d'un système de classe 1, à moins que ce dernier ne soit complété d'un autre système prévu à cette fin. Ce système d'appoint appartient généralement à la classe 2, et il s'agit le plus souvent d'un puits absorbant.

Il est en principe déconseillé d'employer conjointement un système de classe 1 et un de classe 2 dans le cas d'une nouvelle construction. Les installations de classe 2 ayant une capacité limitée, ce double système n'est habituellement pas suffisant pour éliminer toutes les eaux usées de l'habitation. Une autorisation peut toutefois être accordée si les quantités d'eau utilisées sont minimes, comme dans le cas où l'on se sert d'une pompe à eau ou encore si le système sous pression dessert un nombre limité d'installations (un évier et un lavabo, par exemple). Pour plus de détails sur les systèmes de classe 2, voir plus loin.

reduced by as much as 30 to 40 per cent; a reduction often sufficient to allow the existing system to continue operating without overloading or failure.

Where guest houses or cabins are used for sleeping only, and all other activities, such as bathing and cooking are carried out in the main building, the use of a class 1 sewage system for the sleeping quarters may be permitted.

For a typical design of a pit privy see Figure 3 on page 8.

CLASS 2 SEWAGE SYSTEMS

Leaching pits (Class 2 sewage systems) are designed to receive and treat grey water only. Since their ability to handle even a limited flow depends on favorable soil conditions, they are generally not able to handle the disposal of grey water from showers, baths, washing machines, dishwashers or garburetors.

Leaching pits may be used in combination with a class 1 sewage system at the discretion of the approving director.

DESIGN

The following design requirements for class 2 sewage systems are contained in the Ontario Regulation 374/81, Section 8(2).

1. The bottom of the pit shall be at least 0.5 metres above the high groundwater table.
2. The pit shall be constructed in such a manner as to prevent the collapse of its sidewalls.
3. Any material used to support or form the sidewalls of the pit shall be an open jointed material of a type that will permit leaching from the pit.
4. The pit shall be provided with a tight, strong cover that shall remain over the pit except when it is necessary to remove it to add sewage, to remove sewage from the pit, or for the maintenance of the pit.
5. The earth around the perimeter of the pit shall be raised or mounded to a height of at least 0.15 metres above the ground level.
6. The surface of the ground in the area of the pit shall be so graded that the surface drainage in the area will be diverted away from the pit.
7. The pit shall be surrounded on all sides and on its bottom by at least 0.6 metres of earth.

The design of a leaching pit depends on the permeability of the soil and the expected volume of grey water to be treated. In sizing a leaching pit the only sidewall area considered effective is that below the bottom of the inlet pipe.

The sidewall should not be subject to a loading, in terms of litres per square metre per day ($L/m^2 \bullet d$), in

Un système de classe 1 peut constituer une solution intéressante lorsque la fosse septique en place n'est plus suffisante. L'emploi d'un système de classe 1 peut en effet réduire de 30 à 40 % les quantités d'eaux usées déversées dans la fosse septique; cela est souvent suffisant pour éviter une surcharge ou une panne de l'installation en place.

Dans le cas des chalets ou des cabines servant uniquement au couchage, l'emploi d'un système de classe 1 pourra être autorisé à condition que toutes les autres activités, comme la toilette et la cuisine, s'effectuent dans le bâtiment principal.

On trouvera à la figure 3 de la page 10 un modèle type de latrine à simple trou.

SYSTÈMES DE CLASSE 2

Les puits absorbants (systèmes de classe 2) sont conçus pour recevoir uniquement les eaux ménagères. Vu que leur capacité d'absorption dépend de la nature du sol, ils ne permettent généralement pas d'éliminer les eaux ménagères provenant des douches, des baignoires, des lave-linge, des lave-vaisselle et des broyeurs d'ordures.

Un puits absorbant peut être utilisé avec un système de classe 1 sous réserve de l'accord du directeur des autorisations.

CONSTRUCTION

Les règles à suivre pour la construction des systèmes de classe 2 sont énoncées comme suit au paragraphe 8(2) du Règlement 374/81 de l'Ontario :

1. Le fond du puits doit être à au moins 0,5 mètre au-dessus du niveau supérieur de la nappe phréatique.
2. Les parois latérales du puits doivent être construites de telle manière qu'elles ne puissent s'effondrer.
3. Les matériaux utilisés pour soutenir ou construire les parois du puits doivent être à joints ouverts et de nature à permettre l'épandage des eaux d'égouts qui y sont contenues.
4. Le puits doit être pourvu d'un couvercle solide et bien ajusté, qu'on ne doit enlever que si l'on veut ajouter ou retirer des eaux d'égout, ou bien procéder à l'entretien du puits.
5. Sur le pourtour, la terre doit former un talus ou un monticule d'une hauteur d'au moins 0,15 mètre au-dessus du niveau du sol.
6. L'inclinaison du sol aux alentours doit être telle que les eaux drainées en surface s'éloignent du puits.
7. Il doit y avoir au moins 0,6 mètre de terre tout autour du puits et sur le fond.

Le type de puits absorbant dépend de la perméabilité du sol et du volume d'eaux ménagères à traiter. Pour établir la grandeur du puits, la seule paroi qu'il importe de considérer est celle qui se trouve au-dessous du tuyau d'arrivée.

La charge supportée par cette paroi ne doit pas être supérieure à 400/T où 400 désigne le nombre de litres par mètre carré et par jour ($L/m^2.j$), et T le temps de

excess of 400/T, where T is the percolation time in minutes per centimetre of the soil under and surrounding the pit.

Once the sidewall area is determined, it can be provided by either a shallow pit of large perimeter or a deeper pit of smaller perimeter. If adequate soil depth is available, the latter is more practical, as it reduces the size (and weight) of the cover, or cover sections.

Since the liquid entering the surrounding soil must disperse downwards or laterally without breakout to the surface, the pit and its surrounding soil should not be located in a depression which collects run-off and drains slowly.

The per capita flow of grey water may range between 20 to 140 litres per day. The daily sewage flow to the pit will depend on the number of occupants, the type of fixtures available and the use of any pressurized water supply. Once a decision is made on the grey water flow and the soil percolation rate is established, the size of the leaching pit can be determined by:

- calculating the permissible soil loading as follows: soil loading in $L/m^2 \bullet d$ = 400/T ;
- finding the sidewall area required below the inlet pipe as follows: sidewall area (m^2) = Q/loading = QT/400 ; and
- determining the perimeter measurement, depth and shape that will suit the location on the property and will provide the required sidewall area.

A rectangular pit with adequate sidewall area and an easily removable cover is recommended.

If a very low value of T is used, the sidewall area determined from the formula QT/400 will be very small. A pit designed on this basis would have excessively high sidewall loading, which could result in problems with the dispersal of the liquid into the surrounding area. To avoid such loadings the design value of T should not be less than four.

Example:

Assume a soil of T = 10 min/cm and a two-bedroom cottage with two persons per bedroom. If the per capita design flow is 40 L/d then:

$$\text{Loading} = 400/T = 400/10 = 40\ L/m^2 \bullet d$$
$$\text{Sidewall area} = \frac{40 \times 2 \times 2}{40} = 4\ m^2$$

If the overall depth to the bottom of the pit is 1.2 metres, and there is 0.8 m below the inlet, the pit perimeter will be 4/0.8 = 5m . A rectangular pit 1.5m metre in length and 1 metre in width would be adequate.

For details of a typical class 2 sewage system see Figure 4 on page 9.

percolation au-dessous et autoir du puits, exprimé en minutes par centimètre.

Une fois calculées les dimensions des parois, on a le choix entre un puits peu profond de grande superficie et un puits profond couvrant un périmètre plus petit. Si l'épaisseur de terre est suffisante, la deuxième solution est préférable car elle permet de réduire la grandeur (et le poids) du couvercle ou des parties couvrantes.

Vu que le liquide qui pénètre le sol environnant doit pouvoir se disperser dans le fond ou sur le côté sans ressurgir, le puits et le secteur environnant ne doivent pas être situés dans une dépression d'où les eaux accumulées s'écoulent avec difficulté.

Le volume d'eaux ménagères quotidien peut varier de 20 à 140 litres par personne. La quantité d'eaux déversées quotidiennement dans le puits dépend du nombre d'occupants, des installations en place et de l'alimentation en eau, selon qu'elle s'effectue sous pression ou non. Une fois que l'on connaît le volume d'eaux ménagères à éliminer et la vitesse de percolation du sol, il est possible d'établir les dimensions du puits absorbant de la façon suivante :

- en calculant la charge admissible : charge admissible en $L/m^2.j$ = 400/T;
- en calculant la surface de la paroi située au-dessous du tuyau d'arrivée : surface (m^2) = Q/charge = QT/400; et
- en déterminant le périmètre, la profondeur et la forme du puits de façon qu'ils soient adaptés à l'emplacement de l'habitation et que la paroi ait la surface voulue.

Il est recommandé de construire un puits rectangulaire dont la paroi ait la grandeur appropriée et qui possède un couvercle facile à retirer.

Si le temps T est très faible, la surface de la paroi calculée à l'aide de la formule QT/400 sera très réduite. Dans ce cas, la paroi sera soumise à une charge excessivement élevée, ce qui pourra rendre difficile la dispersion du liquide dans le secteur environnant. Pour éviter de telles charges, il conviendra de prendre une valeur T au moins égale à quatre.

Exemple :

Prenons l'hypothèse d'un sol dont la vitesse de percolation est égale à T = 10 min/cm, et d'un chalet de deux chambres à coucher accueillant deux personnes par chambre. Si le volume d'eau consommé par personne doit être égal à 40 L/j, on aura alors :

$$\text{Charge} = 400/T = 400/10 = 40\ L/m^2.j$$
$$\text{Surface de la paroi} = \frac{40 \times 2 \times 2}{40} = 4\ m^2$$

Si la profondeur totale du puits est de 1,2 mètre et que le tuyau d'arrivée est à 0,8 mètre au-dessus du fond, le périmètre du puits sera égal à 4/0,8 = 5 mètres. Un puits rectangulaire de 1,5 mètre de longueur et de 1 mètre de largeur fera l'affaire.

On trouvera à la figure 4 de la page 12 un exemple type de système de classe 2.

CLASS 3 SEWAGE SYSTEM

A class 3 sewage system shall receive or be used only for the disposal of the contents of a class 1 sewage system, or effluent which has passed through a leaching bed in use before April 16, 1974. The design of a class 3 sewage system is the same as for a class 2 sewage system. A design for a typical class 3 sewage system is shown on Figure 5 on page 10.

PREFABRICATED SEWAGE SYSTEMS

Class 1 and class 2 sewage systems may be prefabricated and sold by manufacturers or their agents. This is particularly true for class 1 composting sewage systems, a large number of which are on the market.

Although manufacturers often ask the ministry to "approve" their propriety systems, Environment Ontario does not conduct a testing program of the "consumer report" type to determine the efficiency or reliabiltiy of the units.

The ministry does review data submitted by the manufacturer to ensure that the class 1 classification is appropriate, and if it is, the manufacturer or his agent is so advised by letter. Matters concerning conditions of use and acceptable advertising claims are also stated. For example, since class 1 toilets only dispose of human waste, they should not be advertised as a solution to all sewage disposal problems; the grey water requires a separate system.

There are no approved proprietary class 2 sewage systems. The regulation contains standards for class 2, 4, 5 and 6 sewage systems that may be used for grey water disposal.

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SYSTÈME D'ÉCOULEMENT DE CLASSE 3

Un système d'écoulement de classe 3 doit servir uniquement à recevoir des déchets d'un système de classe 1, ou des effluents ayant traversé un champ d'épandage mis en service avant le 16 avril 1974. La construction est identique à celle d'un système de classe 2. Un exemple type de système de classe 3 est présenté à la figure 5 de la page 13.

SYSTÈMES D'ÉCOULEMENT PRÉFABRIQUÉS

Les systèmes des classes 1 et 2 peuvent être préfabriqués et vendus par les fabricants ou leurs agents. C'est surtout le cas des systèmes à compost de classe 1, dont on trouve un grand nombre sur le marché.

Bien que les fabricants demandent souvent au Environnement Ontario d'« approuver » leurs systèmes, ce dernier n'effectue aucune vérification du genre des tests destinés aux consommateurs pour établir le degré d'efficacité ou de fiabilité des installations.

En revanche, le ministère vérifié les renseignements fournis par le fabricant pour s'assurer que son système peut être rangé dans la classe 1 et, si c'est le cas, le fabricant ou son agent en est informé par lettre. Il lui précise aussi les règles à suivre concernant les conditions d'emploi et la publicité. Par exemple, étant donné que les toilettes de classe 1 servent uniquement à l'élimination des déchets d'origine humaine, la publicité qui s'y rapporte ne doit pas laisser croire qu'elles constituent une solution à tous les problèmes d'élimination des eaux usées; les eaux ménagères nécessitent un système distinct.

Il n'existe sur le marché aucun système préfabriqué breveté de classe 2 qui ait été autorisé. Le règlement précise les normes que les systèmes de classes 2, 4, 5, et 6 doivent respecter pour pouvoir servir à l'élimination des eaux ménagères.

TABLE 1

LOCATION OF CLASS 1, 2 AND 3 SEWAGE SYSTEMS
(Clearances measured horizontally in metres)

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
Type of system	Well with a watertight casing to a depth of at least 6 metres.*	Other well, or a spring used as a potable water supply.	Lake, river, pond, stream, reservoir, or a spring not used as a potable water supply.
Class 1			
Pit privy	15 m	30 m	15 m
Privy Vault) Pail Privy)	10 m	15 m	10 m
Class 2			
Leaching Pit	10 m	15 m	15 m
Class 3			
Cesspool	30 m	60 m	15 m

**Information on the depth of casing is available from the well drilling logs of the ministry and can be obtained from the Water Resources Branch.*

TABLEAU 1

EMPLACEMENT DES SYSTÈMES D'ÉGOUTS DES CLASSES 1, 2 et 3
(Espacements mesurés horizontalement en mètres)

COLONNE 1	COLONNE 2	COLONNE 3	COLONNE 4
Genre de système	Puits pourvu d'un chemisage étanche jusqu'à une profondeur d'au moins 6 mètres.*	Autres puits, ou source utilisée pour l'approvisionnement en eau potable.	Rivière, lac, étang, ruisseau, réservoir ou source ne servant pas à l'approvisionnement en eau potable.
Classe 1			
Latrine à simple trou	15 m	30 m	15 m
Latrine à fosse fixe Latrine à fosse mobile	10 m	15 m	10 m
Classe 2			
Puits absorbant	10 m	15 m	15 m
Classe 3			
Puissard	30 m	60 m	15 m

**Tous les renseignements sur la profondeur des chemisages sont donnés dans les rapports de forage du ministère et peuvent être obtenus auprès de la Direction des ressources en eau.*

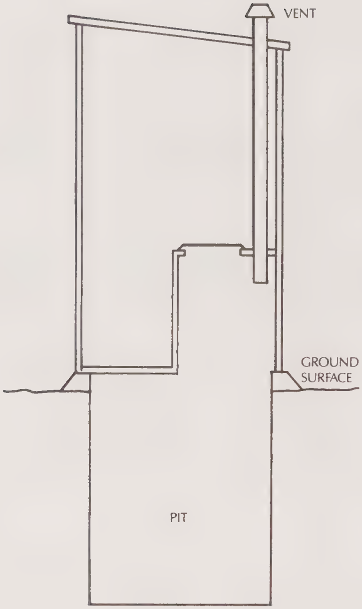
FIGURE 1:

CLASS 1 SEWAGE DISPOSAL SYSTEMS

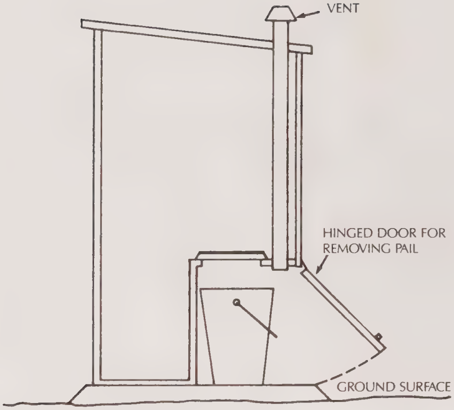
Class 1 systems are used only for the disposal of human body wastes and provision must be made to dispose of waste water to a separate sewage system. The conditions under which Class 1 systems are usually permitted are:

1) Where the installation of standard septic tank and tile bed is not possible due to lot conditions
2) Where provision is made for the adequate disposal of the waste water to a completely separate system. Class 1 systems are not usually permitted if a premises is served by a pressure water system, as seepage pits usually can not adequately handle large flows.

FACILITY	SUITABILTY	LOCATION	CONSTRUCTION	MAINTENANCE
Earth or Pit Privy	Where soil available and groundwater not encountered. Bottom of pit should be 3′ above water table, rock or impermeable soil.	Minimum distances: 15 m from cased well 30 m from dug well 15 m from river, stream, lake, pond, etc. Should be located downgrade from well.	Deep pit, insect and rodent proof. Earth mounted to prevent infiltration or surface water. Pit ventilated.	Good housekeeping required. Natural decomposition of waste should be relatively odourless.
Vault Privy	Where adequate soil not available for pit privy and protection of ground water is required.	Minimum distances: 10 m from cased well 15 m from dug well 10 m from river, stream, lake, pond, etc. Should be located downgrade from well.	Watertight concrete vault. Flytight building. Ventilated vault and building. 15 cubic metres/person/year.	Keep clean, flytight. Clean pit when contents approach within 0.5 m of door. Disposal of contents to a Class 3 or 7 system.
Removable Pail Privy	A temporary facility to protect water supply. Where pit privy is impractical.	Minimum distances as per vault privy.	As per vault privy. Provide easily-cleaned pails.	Provide regular collection service and cleaning facilities, including hot water, long-handled brushes, detergent, drained concrete floor. Disposal of contents to Class 3 or 7 system.
Incinerating Toilets & Composting Toilets	To protect ground water and surface water supplies.	Indoors or adjoining main residence. Should not be used in close proximity to neighbours.	Unit requires a power source. Incinerating toilets also have a cycle time during which they can not be used.	Incinerated ash or dry compost may be disposed of easily: on garden, or buried.
Chemical toilet	To protect underground and surface water supplies.	Indoors or adjoining main residence.	As for masonry vault privy. Tan, may be heavy gauge metal with protective coating. Capacity 550-1150 litres.	Use 30 grams of lye for each cu. ft. of vault capacity. Made up to liquid depth in vault or 11 kg caustic soda per seat in 70 l water. Maintain chemical solution proper strength to keep odours down and agitate after each use. Clean vault when ⅔ - ¾ full. Avoid splashing as solution causes burns.

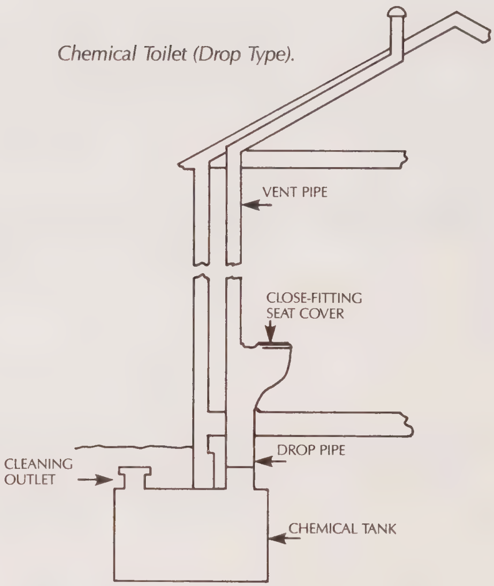


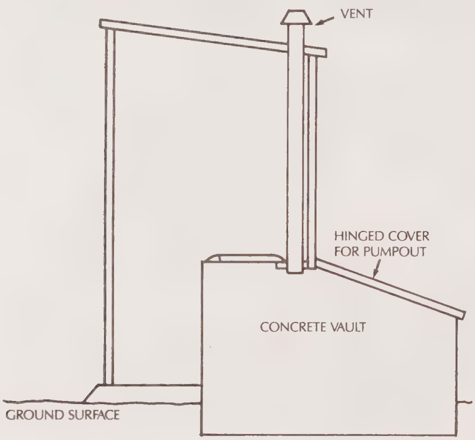
Pit Privy.



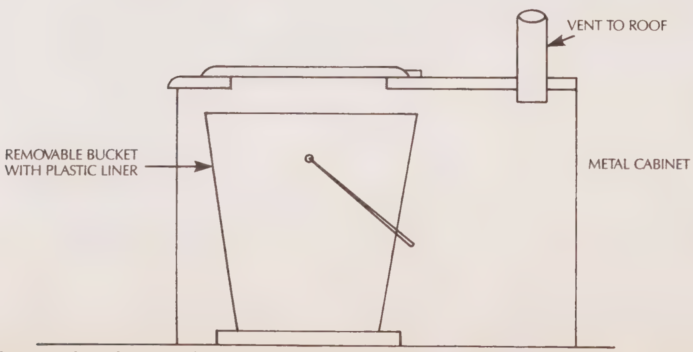
Pail Privy.

Chemical Toilet (Drop Type).

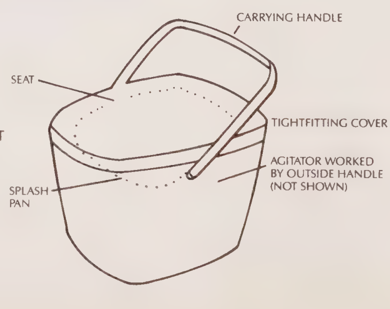




Vault Privy.



Chemical Toilet (Bucket Type).



Portable Chemical Toilet.

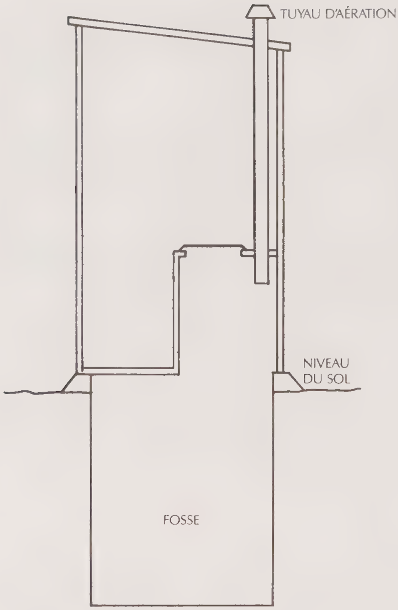
FIGURE 1:

SYSTÈMES D'ÉGOUTS DE CLASSE 1

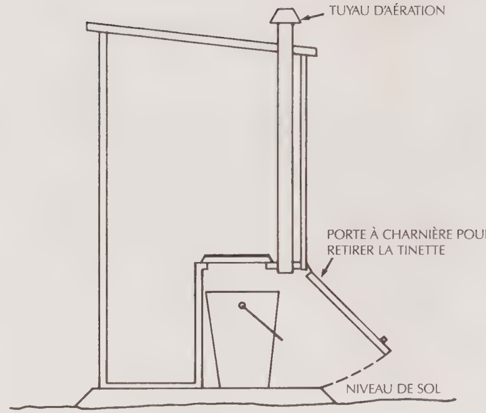
Les systèmes de classe 1 servent uniquement à l'élimination des déchets d'origine humaine, et toutes les dispositions doivent être prises pour que les eaux usées soient éliminées à l'aide d'un système distinct. Il est généralement permis d'utiliser un système de class 1 :

1) lorsque le terrain ne permet pas d'installer une fosse septique ou un lit d'épuration ordinaire;
2) lorsqu'un moyen approprié a été prévu pour déverser les eaux usées dans un système complètement distinct. Les systèmes de classe 1 ne sont habituellement pas autorisés si l'habitation est alimentée en eau par un système sous pression car les puits perdus ne peuvent ordinairement pas absorber de gros débits.

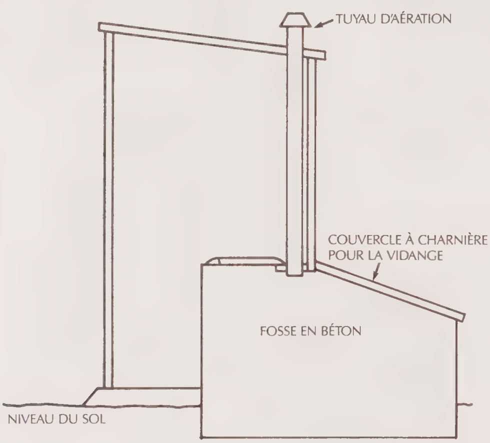
INSTALLATION	CAS D'UTILISATION	EMPLACEMENT	CONSTRUCTION	ENTRETIEN
Latrines à simple trou	Épaisseur de terre suffisante et absence d'eaux souterraines. Le fond de la fosse doit se trouver à au moins 60 cm au-dessus de la nappe phréatique, de la roche ou de la couche de sol imperméable.	Distances minimales : 15 m d'un puits chemisé, 30 m d'un puits ordinaire, 15 m d'une rivière, d'un lac, d'un étang, etc. Doit se trouver au-dessous du niveau des puits avoisinants.	Fosse profonde, protégée contre les insectes et les rongeurs. Sol en pente pour empêcher l'eau de surface de s'infiltrer. Aération suffisante.	Précautions d'usage nécessaires. La décomposition des déchets ne doit dégager aucune odeur ou presque.
Latrines à fosse fixe	Épaisseur de terre suffisante pour construire une fosse à simple trou, et nécessité de protéger les eaux souterraines.	Distances minimales: 10 m d'un puits chemisé, 15 m d'un puits ordinaire, 10 m d'une rivière d'un lac, d'un étang, etc. Doit se trouver au-dessous du niveau des puits avoisinants.	Fosse en béton étanche. Local protégé des mouches. Fosse et local bien aérés. 15 m^3 par personne par an.	Nettoyer régulièrement et empêcher les mouches d'entrer. Vider la fosse lorsque son contenu arrive à 50 cm du couvercle. Transférer le contenu dans un système de classe 3 ou 7.
Latrines à fosse mobile	Installation temporaire utilisée pour protéger l'eau de consommation lorsqu'il est impossible d'installer une latrine à fosse fixe.	Distances minimales: voir fosse fixe.	Voir fosse fixe. Seaux faciles à nettoyer.	Service de ramassage et de nettoyage régulier (eau chaude, brosses à long manche, détergent, sol en béton avec écoulement). Le contenu doit être transporté dans un système de classe 3 ou 7.
Toilettes à incinération et à compost	Pour protéger les eaux souterraines et les eaux de surface.	À l'intérieur de l'habitation ou à proximité. Doivent être installées à une distance suffisante des voisins.	Nécessitent une source d'énergie. Avec les toilettes à incinération, le cycle de combustion doit être interrompu de temps à autre.	Il est facile de se débarrasser des cendres et du compost sec en les répandant dans le jardin ou en les enterrant.
Toilettes chimiques	Pour protéger les eaux souterraines et les eaux de surface.	À l'intérieur de l'habitation ou à proximité.	Comme pour les latrines à fosse fixe. Le réservoir peut être fait d'un métal résistant revêtu d'une couche protectrice. Capacité : de 550 à 1 150 litres.	Utiliser 4 kg de lessive par m^3 de capacité jusqu'à atteindre une profondeur de 15 cm ou verser 10 kg de soude caustique dans 75 L d'eau. Veiller à ce que la solution chimique soit assez forte pour réduire les odeurs, et remuer après chaque usage. Vider le réservoir quand il est plein aux ⅔ ou aux ¾. Éviter les éclaboussures car la solution provoque des brûlures.



Latrine à simple trou

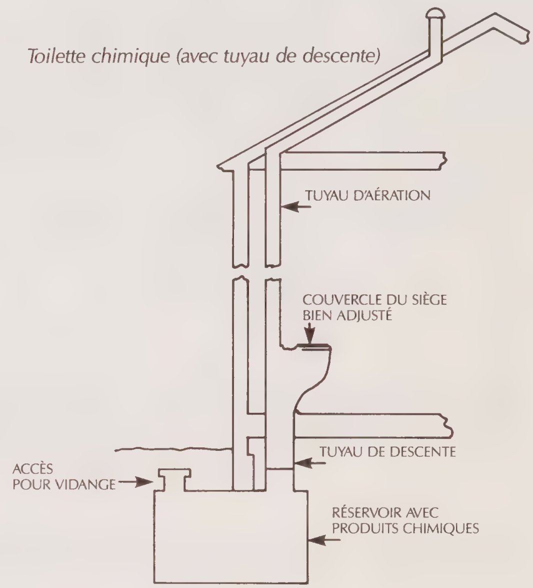


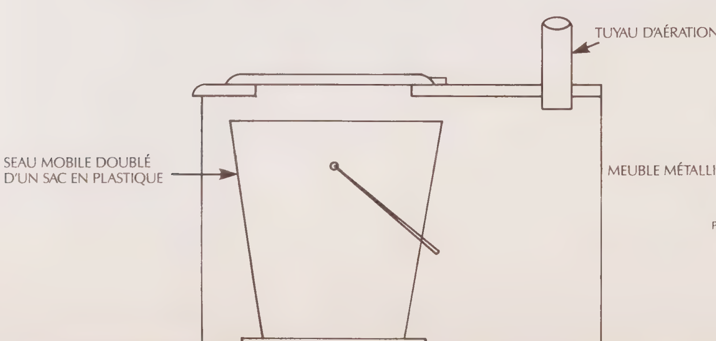
Latrine à fosse mobile



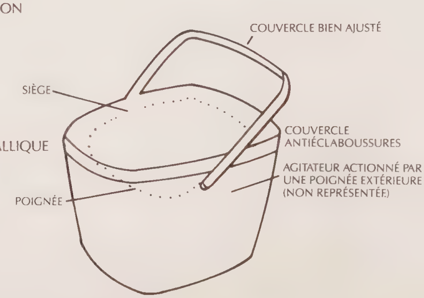
Latrine à fosse fixe

Toilette chimique (avec tuyau de descente)



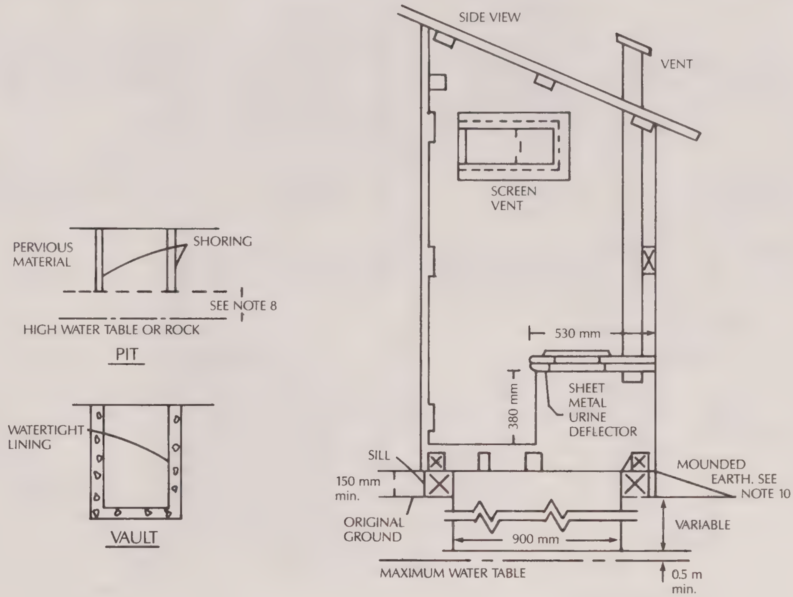


Toilette chimique (avec seau)



Toilette chimique portative

FIGURE 3

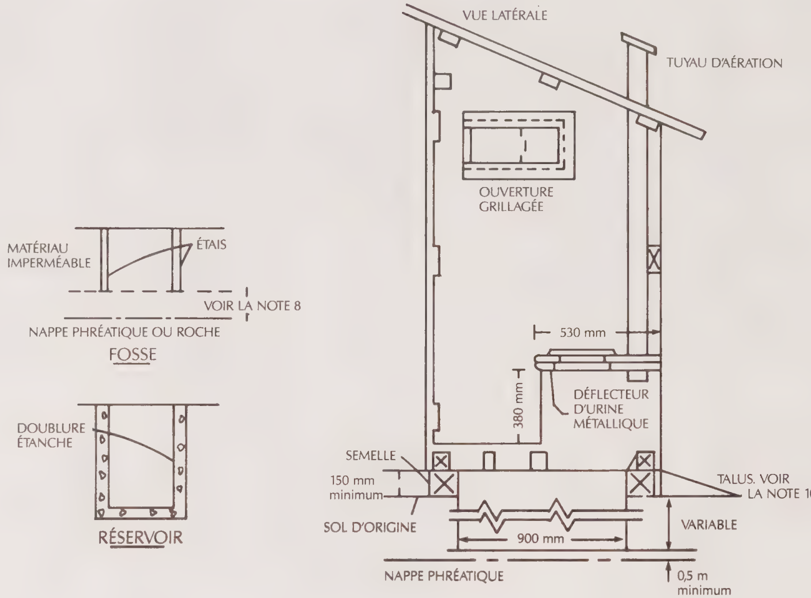


Note

1. Superstructure to be constructed of strong durable weather-proof materials.
2. Solid floor supported by a sill.
3. Equipped with one or more seats having covers supported by an enclosed bench.
4. Self closing door, at least one screened window for ventilation.
5. Bench or riser to be lined with an impervious material on all interior vertical surfaces.
6. Ventilating duct, screened at top, shall extend from underside of the bench to a point above the roof.
7. Sides of pit of pit privy shall be shored to prevent collapse.
8. Pit of pit privy shall be surrounded on all sides and on bottom with 0.6 m of earth and bottom of pit shall be at least 0.5 m above high water table.
9. Vault of vault privies shall be watertight.
10. The ground around all privies shall be graded to promote surface runoff away from privies and the bottom of the surface structure shall be at least 0.15 m above the surrounding ground.
11. The portable privy shall have a superstructure similar to other privies but it must be constructed to withstand the stresses subjected to it while loading and transporting it.
12. The portable privy must have a watertight receptable for the storage of the sewage and it must be designed so that it can be easily cleaned and emptied.
13. Bottom metre of plywood structure should be covered by asphalt shingles or other suitable material to prevent animals from gnawing the wood.
14. Pit should provide an effective volume of 0.06 cu. metres/person/year for year round use.
15. Approximate dimensions 1 metre wide x 1.3 metres deep x 2.5 metres high. Pit to be 1 m x 1 m with variable depth.

CLASS 1 SYSTEM PRIVIES

FIGURE 3

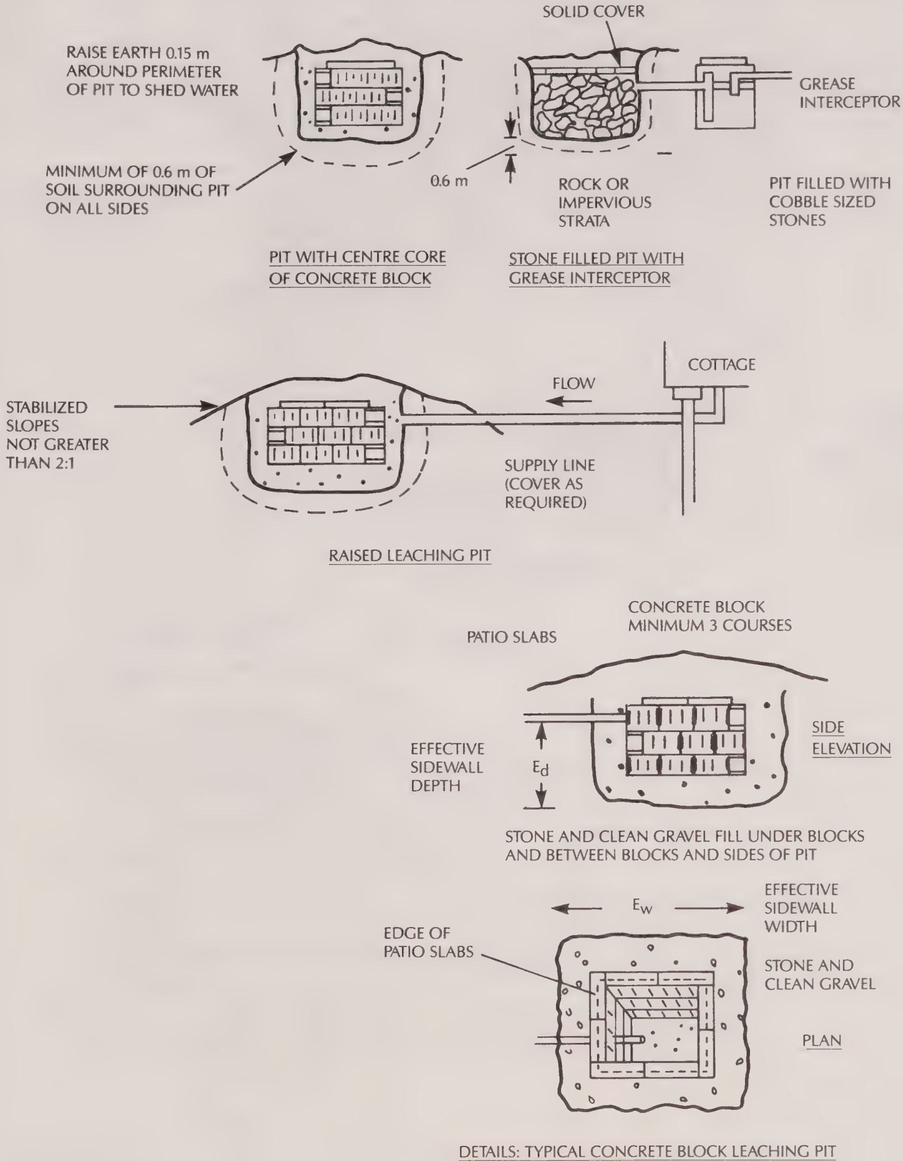


Notes

1. Superstructure faite de matériaux résistants, durables et imperméables.
2. Plancher solide soutenu par une semelle.
3. Un ou plusieurs sièges munis d'un couvercle et reposant sur un banc fermé.
4. Porte à fermeture automatique et au moins une ouverture grillagée pour l'aération.
5. Parois verticales du banc ou de la contre-marche traitées, sur leur face interne, avec un produit imperméable.
6. La colonne de ventilation, grillagée à son extrémité supérieure, s'enfonce sous le banc et se prolonge au-delà du toit de la superstructure.
7. Les côtés de la fosse doivent être renforcés pour ne pas s'effondrer.
8. Il doit y avoir au moins 0,6 mètre de terre tout autour de la fosse et sur le fond, et celui-ci doit se trouver à au moins 0,5 mètre au-dessus de la nappe phréatique.
9. La fosse doit être étanche.
10. L'inclinaison du sol autour de l'abri doit être telle que les eaux drainées en surface s'éloignent de la latrine, et la terre sur laquelle repose la superstructure doit former un talus d'une hauteur d'au moins 0,15 mètre au-dessus du niveau du sol.
11. Les latrines portatives doivent avoir une superstructure semblable à celle des autres latrines, mais elles doivent être construites de façon à résister aux contraintes subies pendant le transport et le chargement.
12. Les latrines portatives doivent être munies d'un récipient étanche convenant à l'entreposage des eaux usées et conçu de manière à en faciliter le nettoyage et la vidange.
13. Le plancher de contreplaqué doit être recouvert de bardeaux d'asphalte ou de tout autre matériau qui empêche les animaux de ronger le bois.
14. Une installation utilisée toute l'année doit permettre d'écouler un volume réel de 0,06 m^3 par personne par an.
15. Dimensions approximatives : 1 mètre de largeur x 1,3 m de profondeur x 2,5 m de hauteur. Dimensions de la fosse : 1 m x 1 m, profondeur variable.

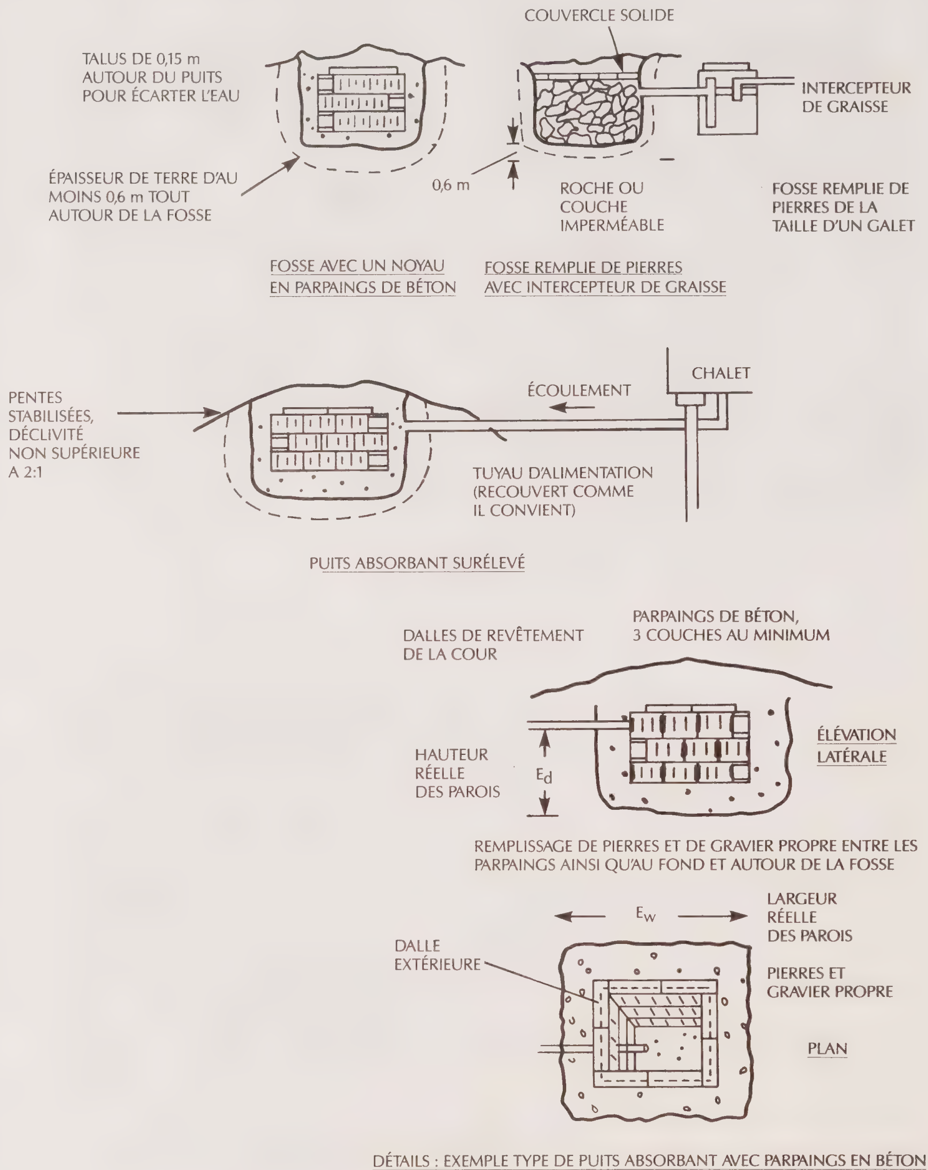
SYSTÈME DE CLASSE 1 LATRINES

FIGURE 4



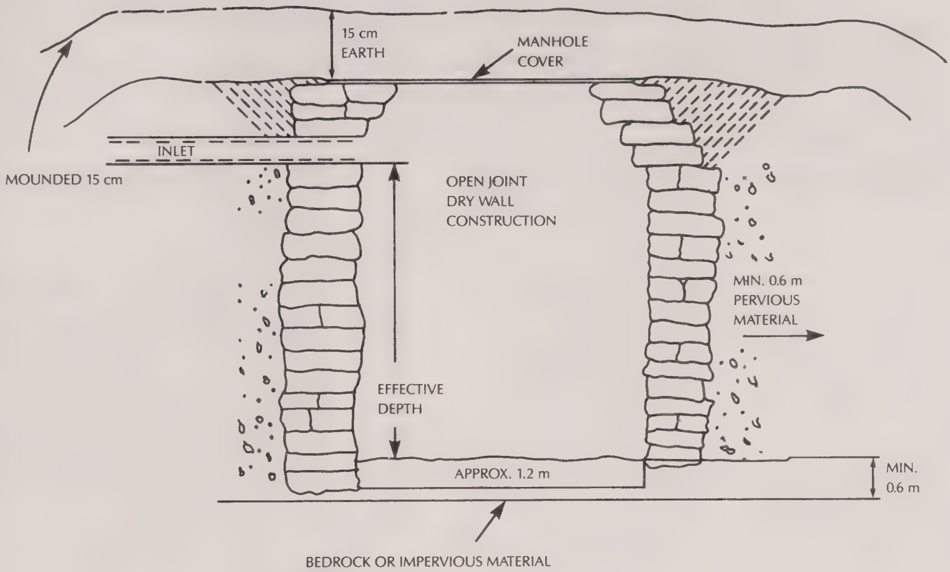
CLASS 2 SYSTEM
TYPICAL LEACHING PITS

FIGURE 4



SYSTÈME DE CLASSE 2
PUITS ABSORBANT TYPE

FIGURE 5

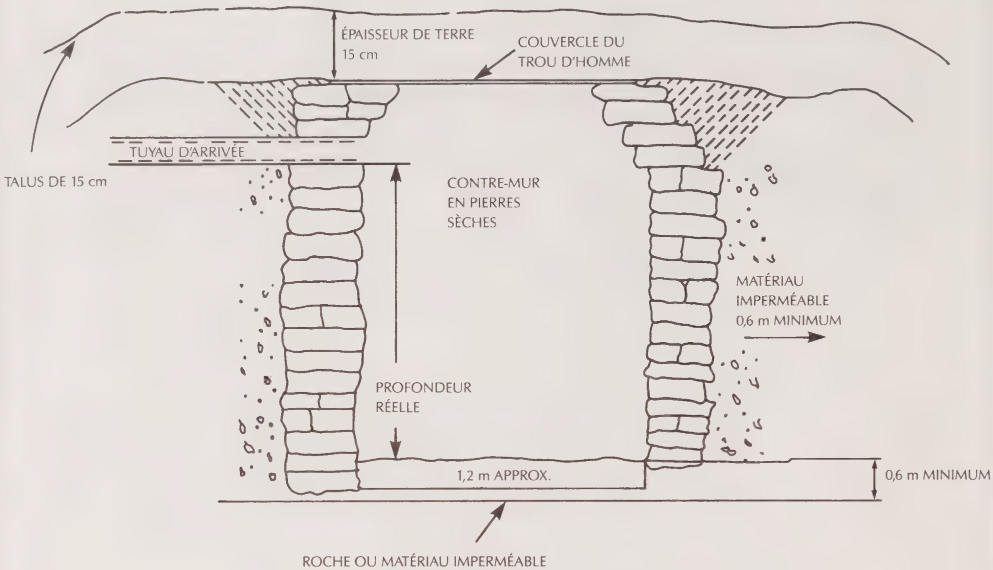


NOTE

1. Bottom of pit must be at least 0.6 m above bedrock or impervious layer.
2. Side of pit must be constructed to prevent collapse and be of material to permit leaching into the surrounding soil.
3. Sides and bottom of pit to be surrounded by at least 0.6 m of permeable material.
4. Earth around the perimeter to be mounded at least 15 cm above surrounding ground level and whole area graded to divert surface water away from the pit.
5. Pit must have a tight strong cover in place at all times except when adding or removing sewage or repairing system..
6. Pit must be at least 30 m from a well with a 6 m casing, 60 m from any other well and 15 m from any lake, pond, river, spring or reservoir.

TYPICAL CESSPOOL

FIGURE 5



NOTE

1. Le fond du puits se trouver à au moins 0,6 m au-dessus de la roche ou de la couche imperméable.
2. Les parois latérales doivent être construites de telle manière qu'elles ne puissent d'effondrer et dans un matériau qui permette aux eaux usées de s'infiltrer dans le sol environnant.
3. Les côtés et le fond du puits doivent être entourés d'au moins 0,6 m de matériau perméable.
4. Sur le pourtour du puisard, la terre doit former un talus qui dépasse d'au moins 0,15 m le niveau du sol et dont la pente permette aux eaux usées de s'écouler vers d'extérieur.
5. Le puisard doit être pourvu d'un couvercle solide et étanche, que l'on ne doit enlever que pour ajouter ou retirer des eaux usées ou pour réparer l'installation.
6. Le puisard doit se trouver à au moins 30 m d'un puits chemisé sur une hauteur de 6 m, à au moins 60 m de tout autres puits et à au moins 15 m d'un lac, d'un étang, d'une rivière, d'une source ou d'un réservoir.

PUISARD TYPE

ENVIRONMENT INFORMATION - ENVIRONNEMENT

SUMMER 1990 Environment Environnement Ontario 1990 ÉTÉ

SEPTIC TANK SYSTEMS

SEWAGE DISPOSAL

For septic tank systems serving dwellings, sewage is defined as waste of domestic origin, which is human body waste, toilet or other bathroom waste, waste from other showers and tubs, liquid or water borne kitchen waste or laundry waste.

A correctly designed, located, constructed and maintained sewage disposal system will function effectively and safely. An improperly designed, located, constructed, or inadequately maintained system can lead to considerable nuisance and expense and seriously endanger health and the environment.

THE LAW AND SEWAGE DISPOSAL

The Environmental Protection Act (EPA) applies to all property in Ontario. Section 64 of the act is specific about the approval required for the construction, alteration or enlargement of a private sewage disposal system and states:

> "No person shall construct, install, establish, enlarge, extend or alter,
> (a) any building or structure in connection with which a sewage system will be used if the use of the building or structure so constructed, installed, established, enlarged, extended or altered will or is likely to affect the operation or effectiveness of the sewage system; or
> (b) any sewage system, unless a certificate of approval for the construction, installation, establishment, enlargement, extension or alteration of the sewage system has first been issued by the Director."

The preceding extract from the EPA makes it clear that a certificate of approval for a sewage system is necessary before any related building construction may begin. In most cases, applications for certificates of approval should be directed to the local health unit, which acts on behalf of Environment Ontario.

LES SYSTÈMES À FOSSE SEPTIQUE

ÉVACUATION DES EAUX USÉES

Pour les systèmes à fosse septique des habitations, l'expression « eaux usées » désigne les déchets domestiques suivants : matières de vidange, écoulements des cabinets d'aisance et des autres appareils sanitaires, baignoires ou douches, eaux grasses, eaux de vaisselle et eaux de lessive.

Un système d'évacuation bien situé, bien conçu et bien construit que l'on entretient comme il faut fonctionnera efficacement et sans risques, tandis qu'un système qui ne répond pas à ces qualités peut créer des embêtements, entraîner des frais considérables et constituer un grave danger pour la santé et l'environnement.

LA LOI ET L'ÉVACUATION DES EAUX USÉES

La Loi sur la protection de l'environnement s'applique à tous les biens-fonds de l'Ontario. L'article 64 de cette loi précise qu'il faut obtenir une autorisation si l'on veut construire un système privé d'évacuation des eaux usées, ou pour modifier ou agrandir un système existant. Il stipule ce qui suit :

> « Nul ne doit construire, mettre en place, créer, agrandir, étendre ni modifier :
> a) un bâtiment ou un ouvrage à l'égard duquel il sera fait usage d'un système d'égouts, si l'usage qui est fait du bâtiment ou de l'ouvrage ainsi construit, mis en place, créé, agrandi, étendu ou modifié a un effet ou peut vraisemblablement avoir un effet sur l'exploitation ou l'efficacité du système d'égouts;
> b) un système d'égouts, à moins que le directeur n'ait au préalable délivré un certificat d'autorisation à ces fins. »

Il ressort clairement de l'extrait précédent qu'il faut obtenir un certificat d'autorisation avant d'aménager un système d'évacuation des eaux usées. Dans la plupart des cas, on doit adresser sa demande de certificat au bureau de santé de sa localité, qui agit au nom Environnement Ontario, mais, au besoin, le bureau local du ministère s'occupera d'étudier la demande. Avant de délivrer un permis de construire, les autorités exigent d'ordinaire la preuve qu'on a obtenu un certificat.

When necessary, the local ministry office deals with the applications. Evidence showing that a certificate of approval has been issued is normally required before a building permit is issued. Aside from this legal requirement, it is in your best interest to get advice before you start to build because the sewage disposal system may be the determining factor in establishing the location and ground elevation of your house or other buildings. Information concerning regulations and application for approval forms may be obtained from your local health unit or ministry office.

In addition, the regulation prescribes the following requirements for the construction, operation and maintenance of all sewage systems:

- Except for a Class 7 sewage system [a hauled sewage system], the sewage system or any part thereof shall not emit, discharge or deposit sewage or effluent onto the surface of the ground.
- Sewage or effluent shall not emit, discharge, seep, leak or otherwise escape from the sewage system, or any part thereof into a piped water supply, well water supply, a watercourse, ground water or surface water.
- Sewage or effluent shall not emit, discharge, seep, leak or otherwise escape from the sewage system or any part thereof other than from a place or part of the sewage system where the system is designed or intended to discharge sewage or effluent.
- Insects and animal life shall be prevented from gaining access to sewage contained in the sewage system.
- No sewage system or any part thereof shall emit, discharge, deposit or allow the emission, discharge or deposit of micro-organisms of intestinal origin into the natural environment in such a manner as may be a hazard to health.
- No gas shall emit, discharge, or otherwise escape from the sewage system into any building or structure except in the manner in which the sewage system wask designed or intended to emit or discharge gas.
- No connections to the sewage system from non-sewage wastewater sources shall be made.
- The operator of the sewage system shall keep it maintained at all times so that its construction remains in accordance with the certificate of approval and any order made under the Act.

SOIL ASSESSMENT

The suitability of soil for absorbing liquid waste depends on characteristics such as its grain size and gradation; the presence of organic compounds; its structure, density and moisture content; "plastic" properties and chemical composition. These characteristics must be assessed to decide the percolative capacity of the soil for handling septic tank effluent.

Mise à part cette prescription légale, il est bon de demander conseil avant d'entreprendre les travaux, car l'installation du système d'évacuation peut déterminer l'emplacement et l'élévation des bâtiments. On peut se renseigner sur les règlements et obtenir les formules de demande de certificat en s'adressant au bureau du ministère ou au bureau de santé de sa localité.

Les règlements imposent également les conditions suivantes pour la construction, le fonctionnement et l'entretien des systèmes d'évacuation des eaux usées :

- Le système d'évacuation ne doit pas émettre, déverser ni déposer d'eaux usées ou d'effluents sur le sol, à moins qu'il ne s'agisse d'un système de classe 7 (système de transport des eaux usées).
- Les eaux usées ou les effluents ne doivent pas s'échapper d'une partie quelconque du système par émission, déversement, infiltration, fuite ou autre pour pénétrer dans des conduites d'eau potable, un puits, un cours d'eau ou les eaux souterraines ou superficielles.
- Les eaux usées ou les effluents ne doivent pas s'échapper d'une partie quelconque du système d'évacuation par émission, déversement, infiltration, fuite ou autre, sauf à l'endroit ou dans la partie du système conçu pour le rejet d'eaux usées ou d'effluents.
- On doit éviter que les insectes ou les animaux n'entrent en contact avec les eaux usées.
- Le système d'évacuation des eaux usées ne doit pas émettre, déverser ou déposer de microorganismes d'origine intestinale dans l'environnement naturel d'une façon qui puisse constituer un danger pour la santé, ni permettre que de tels organismes y soient émis, déversés ou déposés.
- Le système d'évacuation des eaux usées ne doit ni dégager, ni déverser ni laisser échapper des gaz dans un bâtiment ou une structure, sauf de la manière prévue par le système.
- Aucune source d'eau résiduaire ne doit être raccordée au système d'évacuation des eaux usées.
- Le propriétaire du système d'évacuation doit entretenir celui-ci conformément aux indications du certificat et aux règles énoncées dans la Loi.

ÉVALUATION DU SOL

La capacité du sol à absorber les effluents dépend de divers paramètres tels la granulométrie, la présence de composés organiques, la structure, la densité, la teneur en eau, la composition chimique et l'indice de plasticité. Ces caractéristiques doivent être évaluées pour déterminer si la capacité de percolation du sol le rend apte à recevoir les effluents d'une fosse septique.

L'inspection et l'analyse des sols permettent d'obtenir le taux de percolation, ou temps « T », exprimé en minutes par centimètre. Cette mesure est utilisée dans les tableaux.

Based on the results of an inspection and any soil testing undertaken, the percolation rate, "T" time, expressed in minutes per centimetre, is selected and used in the accompanying tables.

ABSORPTION TRENCH LEACHING BED DESIGN – DRAWINGS 1 AND 2

Under normal conditions the ideal location for a leaching bed is in well-drained sandy loam soil, remote from any wells or surface water. The regulation requires the bottom of absorption trenches to be at least 0.5 metres above the highground water table, and at least 0.9 metres above the maximum elevation of rock or of soil with a percolation time of greater than 50 minutes per centimetre.

Where water table is the limiting factor, it is the highest water table that is of concern rather than the average water table or that found at the time of the site investigation.

Gravity flow is permitted for leaching beds with up to 150 metres of distribution pipe. If required by topography, a pump can be used to lift the effluent to a point where gravity flow resumes. If 150 metres or more of distribution pipe is used, the sewage system must have a pump or siphon, contained in a separate compartment which may be part of the tank structure. The pump or siphon must be designed and constructed so that it is capable of discharging from the compartment, within a 15 minute time period, a volume of tank effluent not less than three quarters of the total interior volume of the distribution pipe.

The maximum length of any single absorption trench in a leaching bed is 30 metres.

The area of a leaching bed should be free of trees and bushes so that the bed is well aired and sunlight can reach the surface. Trees should only be permitted within the area of the bed if no damage will occur from the roots, taking into account the size and type of tree, and the arrangement of the tile or pipe runs.

A good growth of grass should be encouraged and maintained over the entire leaching bed area. The plant roots absorb liquid in the soil and transpire it to the atmosphere through their leaves. Sunlight should be allowed to reach the bed to promote evaporation. Traffic, which can destroy the cover of vegetation, compact the soil above the bed, and damage the distribution pipes should be avoided.

BEDS ON SLOPING SITES

Leaching beds constructed in the conventional manner (Drawings 1 and 2) require sites that are level or only slightly sloped. The cost and other problems of levelling the required area will generally limit conventional

LIT D'ÉPANDAGE À TRANCHÉE D'ABSORPTION – SCHÉMAS 1 ET 2

Dans des conditions normales, l'endroit le plus propice pour un lit d'épandage est un loam sablonneux bien drainé, à l'écart de tout puits ou du chemin emprunté par les eaux de ruissellement. Le règlement prescrit que le fond des tranchées d'absorption doit être à 0,5 mètre au moins au-dessus du niveau maximal de la nappe, et à 0,9 mètre au moins au-dessus de la couche la plus élevée de roche ou de sol dont le temps de percolation est supérieur à 50 minutes par centimètre.

Lorsque la nappe est le facteur limitatif, le chiffre considéré est le niveau maximal de celle-ci et non le niveau moyen ou le niveau observé au moment de l'inspection.

L'écoulement par gravité est admis pour les lits d'épandage dont les conduites de distribution s'étendent sur moins de 150 mètres. Si la topographie l'exige, on peut installer une pompe pour élever l'effluent jusqu'au point où l'écoulement par gravité pourra reprendre. Si la longueur des conduites dépasse 150 mètres, le système doit être pourvu d'une pompe ou d'un siphon installé dans une chambre distincte qui peut être incorporée à la structure de la fosse. La pompe ou le siphon doit être conçu de façon à pouvoir décharger de la chambre, en l'espace de 15 minutes, un volume d'effluents au moins égal aux trois quarts du volume intérieur total de la conduite de distribution.

Aucune des tranchées d'absorption d'un lit d'épandage ne peut faire plus de 30 mètres au total.

La zone du lit d'épandage doit être exempte d'arbres et d'arbustes, de façon à ce que le lit soit bien aéré et que la surface du sol de couverture puisse être atteinte par les rayons du soleil. La présence d'arbres ne sera admise à l'intérieur de la zone que si leurs racines ne risquent pas de causer des dommages, compte tenu de la taille et de l'espèce des arbres et de la disposition des conduites ou des drains.

Il est bon de laisser pousser un gazon dru sur toute la surface du lit d'épandage. Les racines de l'herbe et des plantes absorbent l'humidité du sol et la libèrent dans l'atmosphère par leurs feuilles. Il faut que le soleil puisse atteindre le lit pour favoriser l'évaporation. On recommande de limiter la circulation au-dessus du lit car elle risque de détruire le couvert végétal, de tasser la couche du sol et d'endommager les conduites.

LIT INSTALLÉ DANS UN TERRAIN EN PENTE

Les lits d'épandage construits selon le modèle classique (schémas 1 et 2) exigent un emplacement plat ou à faible déclivité. Le coût ou les autres problèmes que pose le nivellement de l'aire voulue limitent l'emploi de ces modèles aux pentes qui ne dépassent pas 1 mètre par 10 mètres de distance horizontale (10 %). Lorsque la pente est plus forte, il faut faire appel à des méthodes d'installation spéciales. Pour de plus amples renseignements à ce sujet, s'adresser au bureau du ministère ou

construction methods to slopes with no more than a one metre rise for each 10 metres horizontal distance (10%). Special methods of installation are required where more steeply sloped sites are encountered. Information on these methods is available from ministry or health unit offices for sites sloped from 10% up to 25% (1 metre vertical to 4 metres horizontal). Leaching beds are not to be constructed on areas where the slope exceeds 25% in any direction.

RAISED LEACHING BEDS – DRAWING 3

In cases where 0.9 metres of acceptable soil is not available between the bottom of the pipe trenches and underlying rock or unacceptable soil, a leaching bed of selected material may be constructed to form a mound in which the absorption trenches can be set, thus obtaining the desired 0.9 metre clearance below the trenches. An unacceptable soil is one having a percolation rate "T" in excess of 50 minutes per centimetre. Similarly, a raised bed may be required in order to provide the 0.5 metres minimum clearance between the bottom of the trenches and high ground water table.

Where high ground water, or a shallow depth of acceptable soil, requires the construction of a leaching bed in imported fill, vertical absorption of the treated sewage in the soil will be restricted. There will be increased lateral movement of liquid in the soil in any direction in which ground water flows away from the bed. To guard against the liquid breaking out to the surface, the regulation requires that there be at least 0.25 metres of acceptable soil cover for at least 15 metres beyond the outer pipes in any direction that this in-ground movement will take place. If surface soils are acceptable, but of inadequate depth, more soil must be added to provide the required depth. If soils of T-time exceeding 50 minutes per centimetre are at the surface, there is no option but to add acceptable soils to meet the mantle requirement.

The quality of imported fill is also restricted by regulation in order to prevent the construction of a leaching bed in imported granular material which is placed directly on a relatively impermeable soil with no provision made for lateral dispersal. This restriction only applies where the upper 0.25 metres of natural soil has a percolation time exceeding 15 minutes per centimetre.

FILTER TYPE LEACHING BEDS – DRAWING 4

A filter type bed is one where a distribution pipe network is set in a continuous layer of stone above a filter bed of sand, specified in the regulation as to depth and type of material. The surface of the filter sand must have the same clearances above rock, above soil

au bureau de santé de sa localité. Ces méthodes sont utilisables quand la pente est supérieure à 10 % mais inférieure à 25 % (1 mètre de dénivellation pour 4 mètres de distance horizontale). Il n'est pas permis de construire un lit d'épandage là où la pente dépasse 25 %.

LIT D'ÉPANDAGE SURÉLEVÉ – SCHÉMA 3

Lorsqu'on dispose de moins de 0,9 mètre de sol acceptable entre le fond des tranchées de drainage et le niveau de la roche ou de la couche de sol inutilisable, on peut aménager un lit d'épandage avec des matériaux choisis de manière à former un monticule où les tranchées d'absorption pourront être installées, obtenant ainsi l'espacement voulu de 0,9 mètre. Un sol inacceptable est un sol dont le taux de percolation « T » est supérieur à 50 minutes par centimètre. Il est parfois nécessaire de surélever le lit pour obtenir l'espacement minimal de 0,5 mètre entre le fond des tranchées et le niveau maximal de la nappe.

Parfois, l'élévation de la nappe phréatique ou l'épaisseur de la couche de sol acceptable exige la construction d'un lit d'épandage en remblai. Ce type de construction réduit toutefois l'absorption verticale des effluents. Résultat : un plus grand mouvement latéral du liquide dans le sol. Pour empêcher le liquide de se diffuser en surface, le règlement exige l'épandage d'une couche minimale de 25 centimètres de sol acceptable sur une distance d'au moins 15 mètres au-delà de l'extrémité des conduites dans toutes les directions où se produira ce genre de mouvement souterrain. Si le sol superficiel est acceptable, mais d'épaisseur insuffisante, il faut en rajouter pour obtenir l'épaisseur voulue. Si des sols dont le temps « T » dépasse 50 minutes par centimètre se trouvent en surface, on n'aura d'autre choix que de rapporter des sols acceptables jusqu'à ce que la couverture soit de la bonne épaisseur.

La qualité des sols rapportés est également réglementée pour empêcher qu'un lit d'épandage puisse être construit dans des matériaux granuleux placés directement au-dessus d'un sol peu imperméable, sans tenir compte de la dispersion latérale. Cette restriction ne s'applique que lorsque les 25 premiers centimètres de sol naturel ont un temps de percolation supérieur à 15 minutes par centimètre.

LIT D'ÉPANDAGE À COUCHE FILTRANTE – SCHÉMA 4

Dans un lit à couche filtrante, le réseau de conduites de distribution est installé dans une couche continue de pierres au-dessus d'un lit de sable filtrant dont l'épaisseur et la composition sont prescrites dans le règlement. L'espace vertical voulu entre la surface du sable filtrant et la formation rocheuse, une couche de sol dont le temps « T » est supérieur à 50 minutes par centimètre ou le niveau maximal de la nappe souterraine est le même que pour le fond d'une tranchée d'absorption. Ce genre de lit occupe un peu moins d'espace pour le traitement des eaux usées, mais la dispersion des eaux traitées dans le

with T-time greater than 50 minutes per centimetre or above high ground water tables, as is required for the bottom of an absorption trench. A filter type bed offers some space saving as far as the sewage treatment area is concerned, but the problem of dispersal of the treated sewage in the soil and the need for a soil mantle to prevent its breakout to the surface are the same. This problem may be accentuated because the application of sewage to the soil is concentrated over a smaller area. Filter beds are not an acceptable option to an absorption trench bed unless the specified filter medium is obtained, or the daily sewage flow does not exceed 5000 litres.

Filter beds are designed according to permissible sewage loading and other regulatory requirements. A typical sand filter is shown in Drawing 4.

CLEARANCES FOR PARTS OF A SEPTIC TANK SYSTEM

In locating a septic tank system, all the clearances listed hereunder are to be measured horizontally (see Drawing 1). They are the minimums required according to the regulation and may have to be increased to prevent pollution if soil or other site conditions so dictate.

No septic tank shall be closer than:

- 15 metres to a well, lake, river, stream, watercourse, pond, spring or reservoir.
- 1.5 metres to any building or structure (including a swimming pool).
- 3 metres to any property boundary.

No distribution pipe in a leaching bed shall be closer than:

- 15 metres to a well which has a watertight casing to at least 6 metres below ground.
- 30 metres to a spring used as a source of potable water or a well, other than a well with a watertight casing to a depth of at least 6 metres.
- 5 metres to any building or structure.
- 3 metres to any property boundary.
- 15 metres to a lake, river, pond, stream or reservoir or to a spring not used as a source of potable water.

Note: The distribution pipe clearance listed above must be increased in any direction in which the surface of the leaching bed is raised above natural grade. The increase is 2 metres horizontally for each 1 metre raised.

FURTHER INFORMATION

If this information sheet has not answered all of your questions about septic tank systems or if it leaves a problem unresolved, you should contact the nearest Environment Ontario or health unit office in your district.

sol et la présence d'une couche de sol suffisante pour empêcher ces dernières de filtrer en surface entraînent les mêmes exigences. Le problème peut même se trouver aggravé du fait que cette solution concentre le contact entre les eaux usées et le sol sur une aire réduite. On ne peut remplacer un lit à tranchée d'absorption par un lit à couche filtrante si on ne peut obtenir le matériau qui servira de filtre ou que l'écoulement quotidien des eaux usées dépasse 5 000 litres.

Les lits filtrants sont conçus en fonction de la charge maximale en eaux usées et d'autres facteurs stipulés dans le règlement. On en trouvera une illustration au schéma 4.

ESPACEMENT À PRÉVOIR POUR LES DIFFÉRENTES PARTIES D'UNE FOSSE SEPTIQUE

L'installation d'un tel système doit respecter les espacements suivants, en mesure horizontale (voir schéma 1). Ces espacements sont les minimums prescrits par le règlement et devront être augmentés pour prévenir la pollution si l'état du sol ou d'autres facteurs l'exigent.

Une fosse septique ne doit pas se trouver à moins de :

- 15 mètres d'un puits, d'un lac, d'une rivière, d'un cours d'eau, d'un ruisseau, d'un étang, d'une source ou d'un réservoir;
- 1,5 mètre d'un bâtiment ou d'un ouvrage, y compris une piscine;
- 3 mètres des limites d'une propriété.

Les conduites du lit d'épandage ne doivent pas se trouver à moins de :

- 15 mètres d'un puits pourvu d'un cuvelage étanche jusqu'à 6 mètres au moins de la surface du sol;
- 30 mètres d'une source utilisée pour l'approvisionnement en eau potable ou d'un puits non pourvu d'un cuvelage étanche jusqu'à 6 mètres au moins de la surface du sol;
- 5 mètres d'un bâtiment ou d'un ouvrage;
- 3 mètres des limites d'une propriété;
- 15 mètres d'un lac, d'une rivière, d'un étang, d'un cours d'eau ou d'un réservoir ou d'une source non utilisée pour l'approvisionnement en eau potable.

REMARQUE : L'espacement prévu pour les conduites devra être augmenté dans toute direction où la surface du lit d'épandage est surélevée par rapport au niveau naturel du sol. L'augmentation sera de 2 mètres par mètre de surélévation.

POUR PLUS DE RENSEIGNEMENTS

Si ce feuillet d'information ne répond pas à toutes vos questions sur les fosses septiques ou si des doutes subsistent dans votre esprit, adressez-vous au bureau du ministère le plus proche ou au bureau de santé de votre district.

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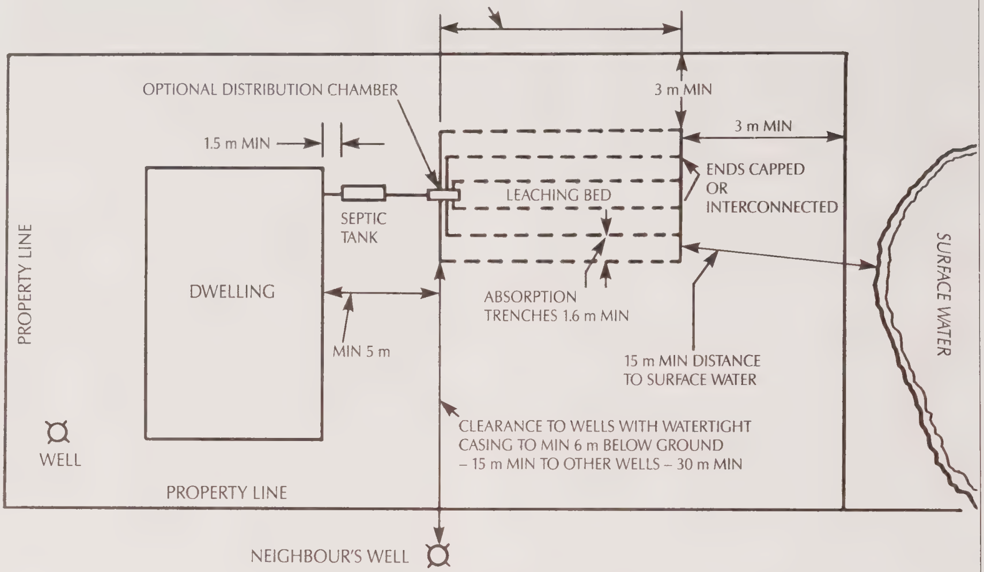
08/90-100M

Drawing No. 1



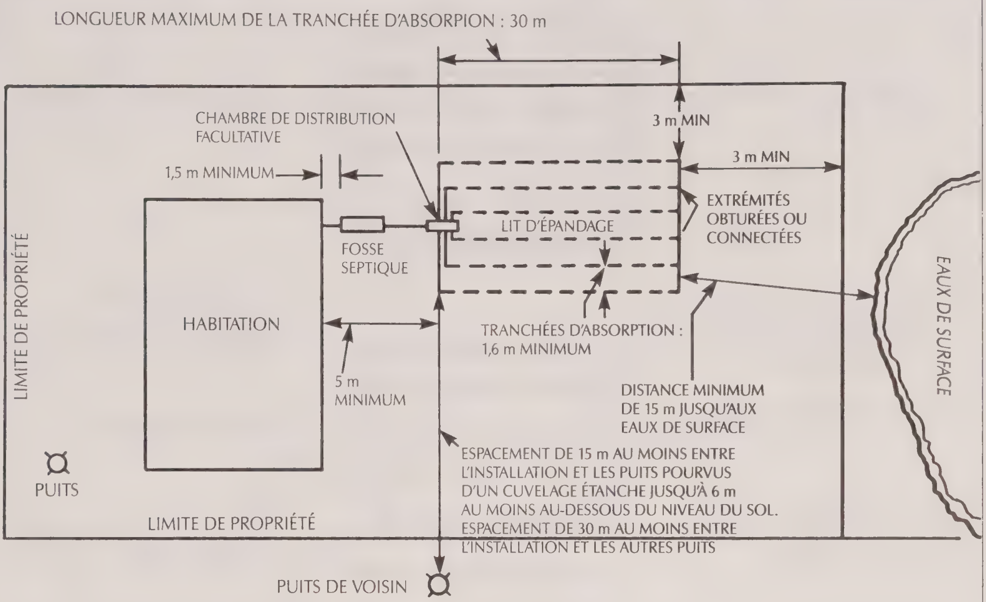
TYPICAL ARRANGEMENT OF A SEPTIC TANK SYSTEM

NOTES:

1. The above layout is suitable for a leaching bed using normal construction methods.
2. Location of tank and leaching bed to be on lower ground than adjacent wells or springs, if possible.
3. Internal plumbing and main drainage outlet should be designed with a view to connecting to possible future sanitary sewers.
4. Roof water, surface water, discharge from footing drains, etc. must be excluded from entry to septic tank.
5. Leaching beds NOT to be located in swampy ground or in ground liable to flooding.
6. See the Regulation regarding details for the siting of the septic tank and tile bed.

CLASS 4 SEWAGE SYSTEMS
TYPICAL SMALL SEPTIC TANK SYSTEM

Schéma Nº 1



DISPOSITION TYPE D'UNE INSTALLATION DE FOSSE SEPTIQUE

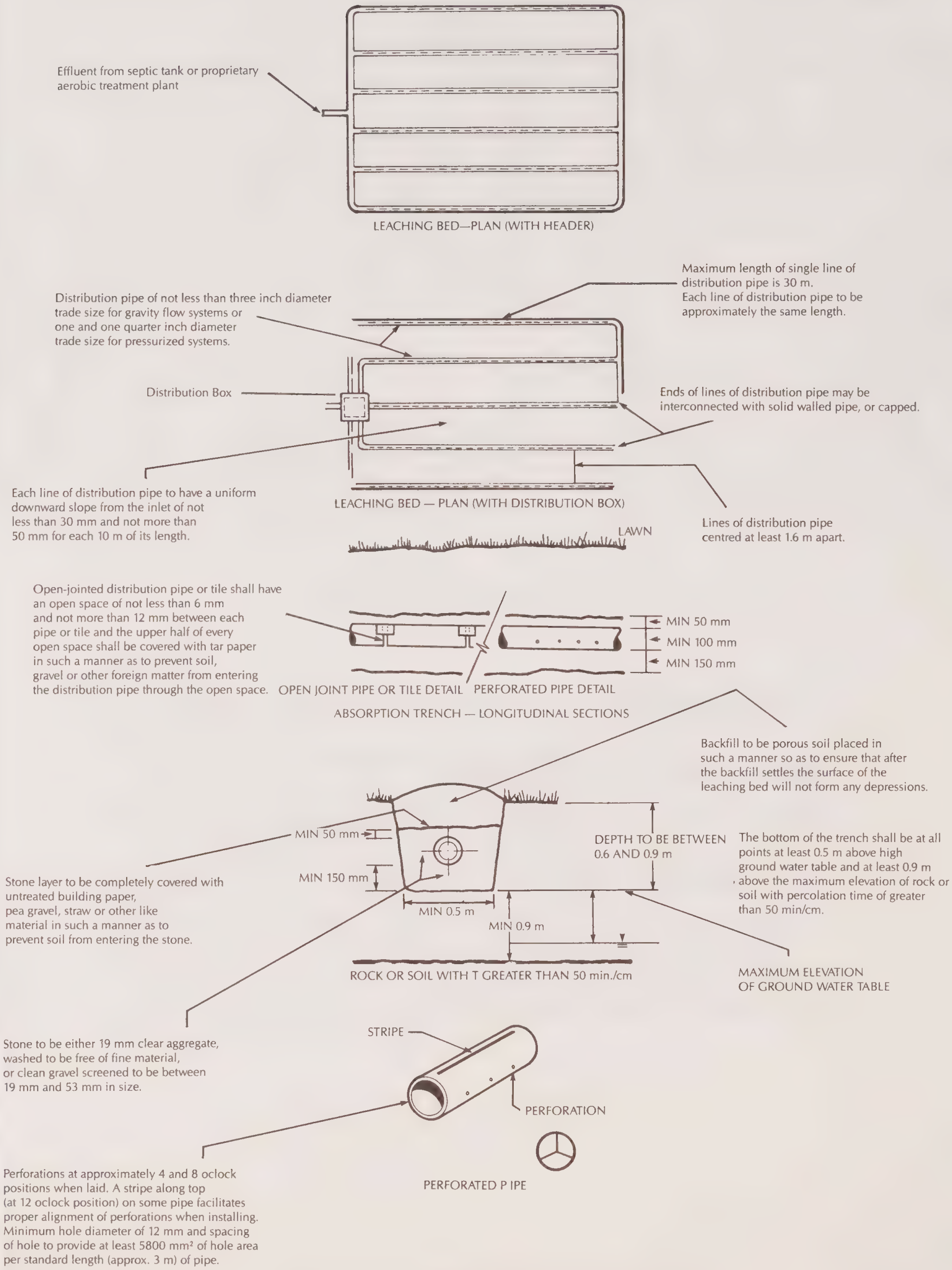
NOTES :

1. Le plan ci-dessus convient pour un lit d'épandage faisant appel à des méthodes de construction normales.
2. La fosse et le lit d'épandage doivent être, si possible, placés sur un terrain plus bas que celui des puits ou des sources adjacentes.
3. La plomberie intérieure et la sortie principale d'écoulement doivent être conçues de manière à être raccordées éventuellement à un futur collecteur d'égout.
4. Les eaux de toiture, les eaux de ruissellement, l'écoulement des rigoles, etc., ne doivent pas pénétrer dans la fosse septique.
5. Les lits d'épandage NE doivent PAS être situés dans un terrain marécageux ou dans un terrain exposé aux inondations.
6. Se reporter au Règlement pour les détails concernant l'emplacement de la fosse septique et de la couche de tuiles.

SYSTÈMES D'ÉGOUT DE LA CLASSE 4

PETITE INSTALLATION TYPE DE FOSSE SEPTIQUE

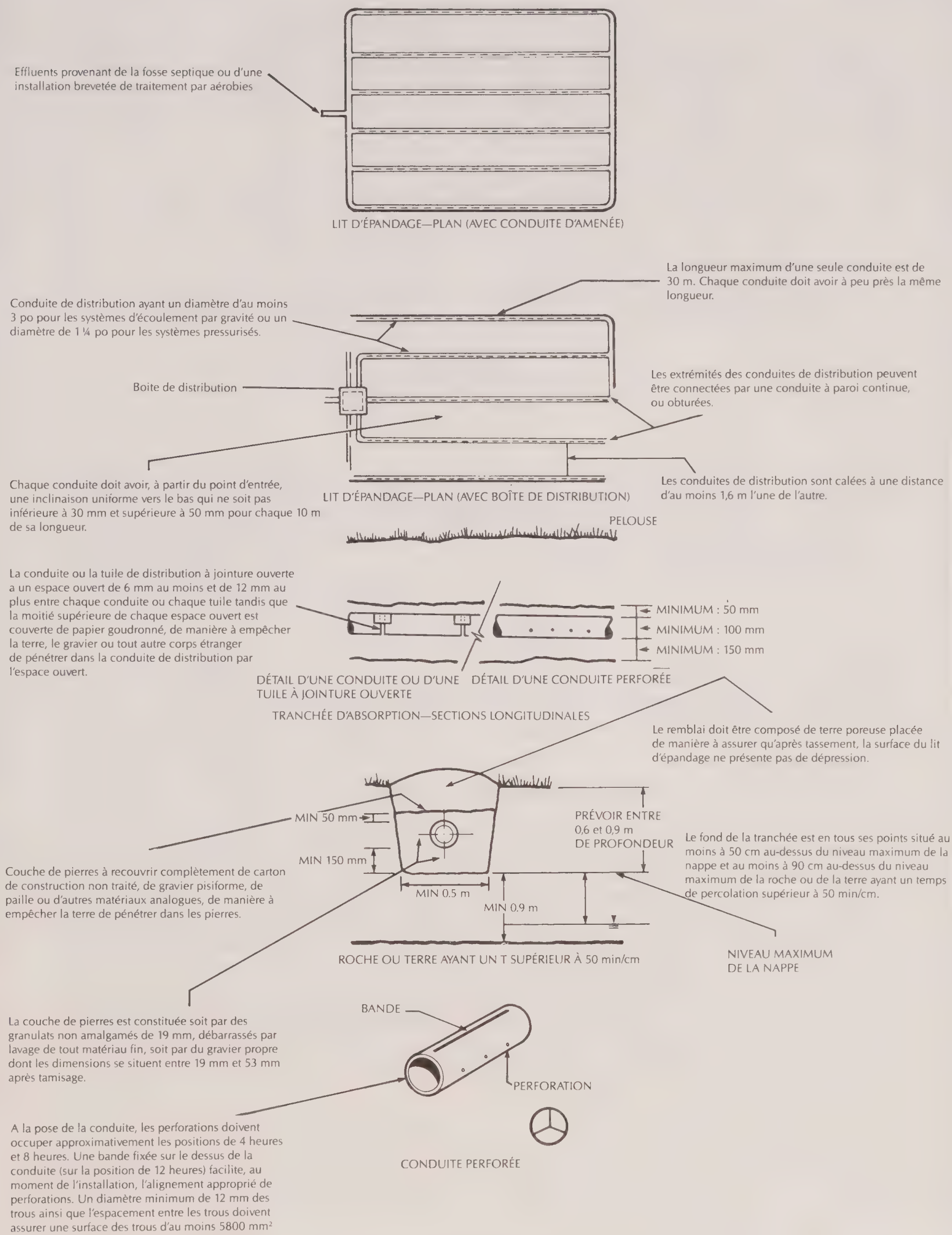
Drawing No. 2



Reference:
Ontario Regulation 374/81 Section 10—(3)

CLASS 4 SEWAGE SYSTEMS
TYPICAL DETAILS – SMALL LEACHING BEDS

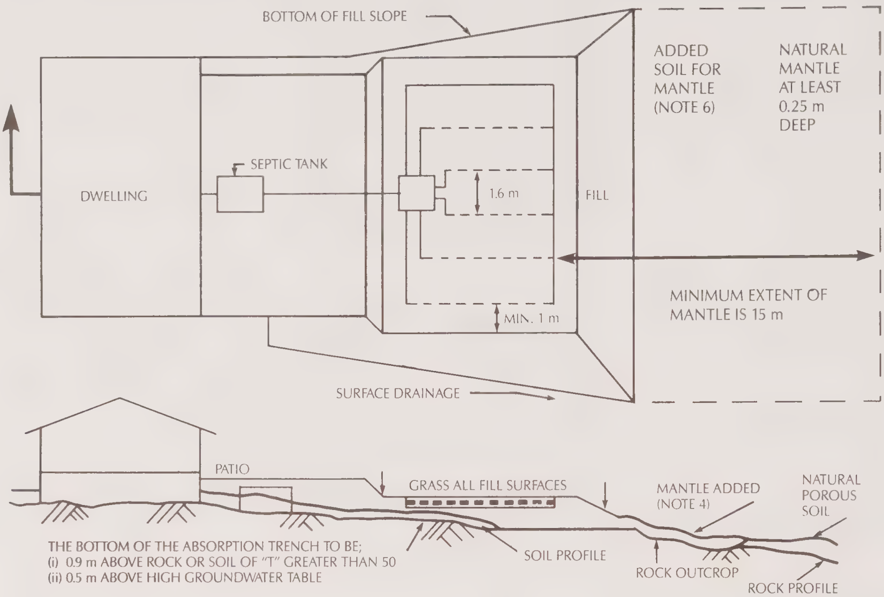
Schéma N° 2



SYSTÈMES D'ÉGOUT DE LA CLASS 4
DÉTAILS TYPES PETITS LITS D'ÉPANDAGE

Référence : Règlement de l'Ontario 374/81 Article 10—(3)

Drawing No. 3

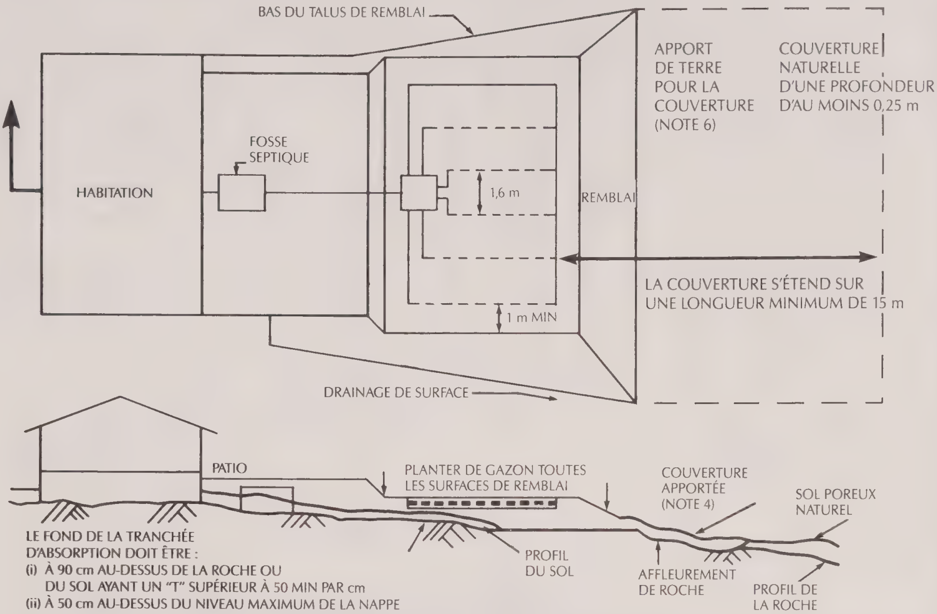


Plan and Profile — Typical Raised Bed

1. Clearances from buildings, lot lines, wells, etc., as for normal leaching beds plus 2 metres horizontal for each 1 metre vertical that surface of bed is above grade.
2. Fill slope must be stable for the material used, but not steeper than 2 metres horizontal to 1 metre vertical.
3. Percolation rate "T" of imported material should preferably be not less than 2 min/cm.
4. Effluent passing through fill must be absorbed into natural soil beneath the fill or into the surrounding permeable soil without ponding or breakout to surface. The relationship between the percolation time of the fill forming the leaching bed and that of the soil on which it is placed, and the requirements for a minimum soil mantle for 15 metres beyond the outer pipes in any direction in which the effluent from the leaching bed may move in the soil, are contained in the regulation and illustrated in appendix 8.4.1.
5. Details of absorption trench construction same as in drawing no. 8.1.1.
6. Where soil mantle (note 4) is absent, or of inadequate depth, soil must be added to meet the requirements of the regulation. This may be added over an area or, where the topography is uneven, only over the routes in which it is obvious that the in-ground movement will take place.

LEACHING BEDS
TYPICAL LAYOUT — RAISED LEACHING BED

Schéma N° 3



PLAN ET PROFIL — LIT TYPE SURÉLEVÉ

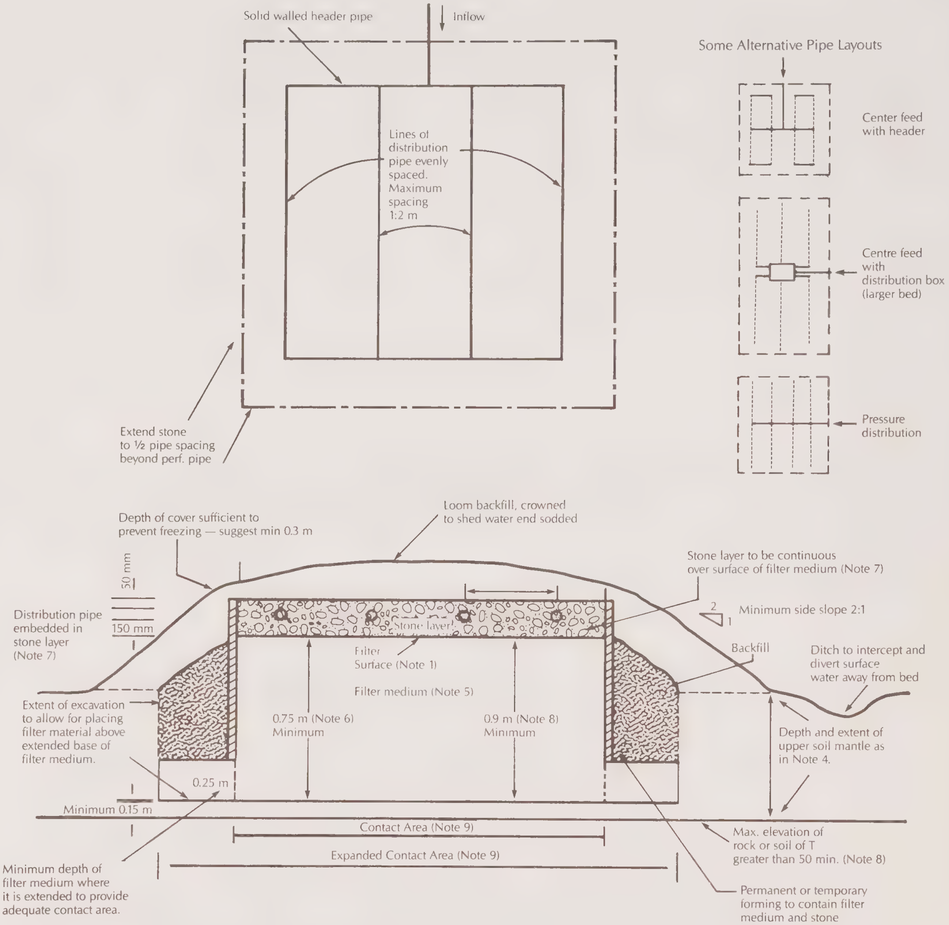
1. Les espacements entre l'installation et les bâtiments, les limites de parcelle, le puits, etc., sont identiques à ceux des lits d'épandage normaux plus 2 mètres de distance horizontale pour chaque mètre de surélévation de la surface du lit.
2. Le talus de remblai doit être stable pour les matériaux utilisés sans que son inclinaison soit plus accentuée que celle correspondant à 2 mètres de distance horizontale pour 1 mètre de dénivellation.
3. Le taux de percolation "T" des matériaux rapportés ne doit pas, de préférence, être inférieur à 2 minutes par centimètre.
4. Les effluents traversant le remblai doivent être absorbés dans la terre naturelle en dessous du remblai ou dans la terre perméable avoisinante sans accumulations ou remontées à la surface. Le rapport entre le temps de percolation du remblai formant le lit d'épandage et celui de la terre sur laquelle le lit est placé ainsi que les prescriptions prévoyant une couverture de terre minimale sur une longueur de 15 mètres au-delà des conduites extérieures dans les directions centrifuges d'écoulement interne des effluents provenant du lit d'épandage sont indiqués dans la règlementation et illustrés à l'annexe 8.4.1.
5. Les détails concernant le creusement de la tranchée d'absorption sont les mêmes que dans le schéma n° 3.
6. Lorsqu'il n'y a pas de couverture de terre (note 4) ou lorsque celle-ci a une épaisseur insuffisante, il convient d'ajouter de la terre pour répondre aux conditions fixées par la réglementation. La terre peut être rapportée sur une zone ou, lorsque la topographie est inégale, ne recouvrir que les passages qui seront de toute évidence empruntés par le cheminement intérieur.

LITS D'ÉPANDAGE
DISPOSITION TYPE LIT D'ÉPANDAGE SURÉLEVÉ

Drawing No. 4

TYPICAL SAND FILTER

(Adaptable for use with both class IV or class VI sewage system)



NOTES

Refer to O. Reg. 374/81 (Sec. 10 and Sec. 12) for regulations governing sand filter type Leaching beds.

1. Maximum area of filter surface 50 m².
2. Permissible loading on filters:

Class IV sewage systems	75 L/m²/day for flows up to 3000 L/day.
	50 L/m²/day for flows between 3000 L/day – 5000 L/day.
Class VI sewage systems	150 L/m²/day for flows up to 6000 L/day.
	100 L/m²/day for flows between 6000 L/day and 10,000 L/day.

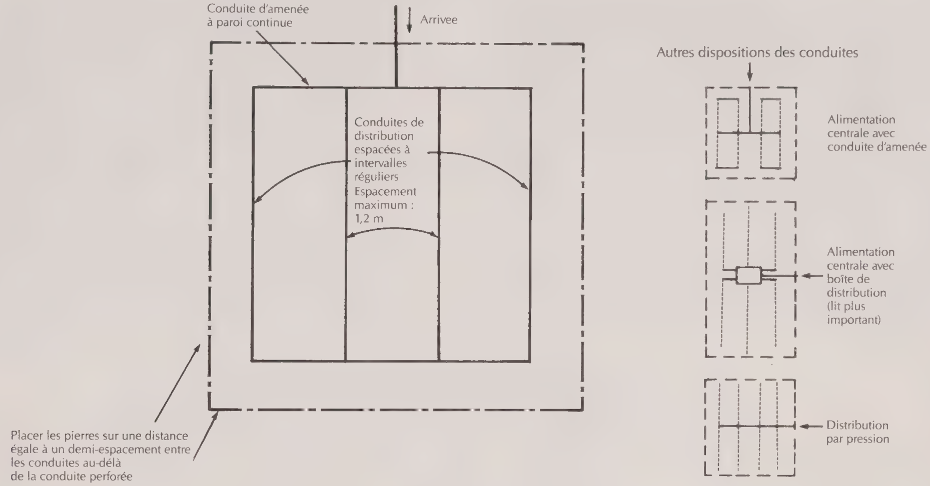
3. The maximum daily sewage flow of a sewage system in which the leaching bed may be of the filter type is 5,000 L for a class 4 sewage system, and 10,000 L for a class 6 sewage system. At maximum size in each case two 50 m² filters are required.
4. A soil mantle of T not greater than 15 min./cm and at least 0.25 m in depth is required to extend at least 15 m beyond the outer distribution pipes in any direction in which the effluent from the bed will move laterally. It must be added if the soil in or on which the filter bed is to be constructed has a T value exceeding 15 min/cm.
5. Only filter material meeting grading requirements acceptable to the Ministry of the Environment may be used.
6. Minimum depth of specified filter material 0.75 m.
7. Pipe to be bedded in stone that is either 19 mm clear aggregate washed to be free of fine material, or clean gravel screened to be between 19 and 53 mm in size.
8. Surface of sand filter material to which sewage is applied must be a minimum of 0.9 m above rock or soil of T greater than 50 minutes/cm and at least 0.5 m above the high groundwater table.
9. Contact area between the filter medium and the underlying soil must not be less than the area A = QT/850 where Q is the daily sewage flow in litres and T is the percolation time of the underlying soil.

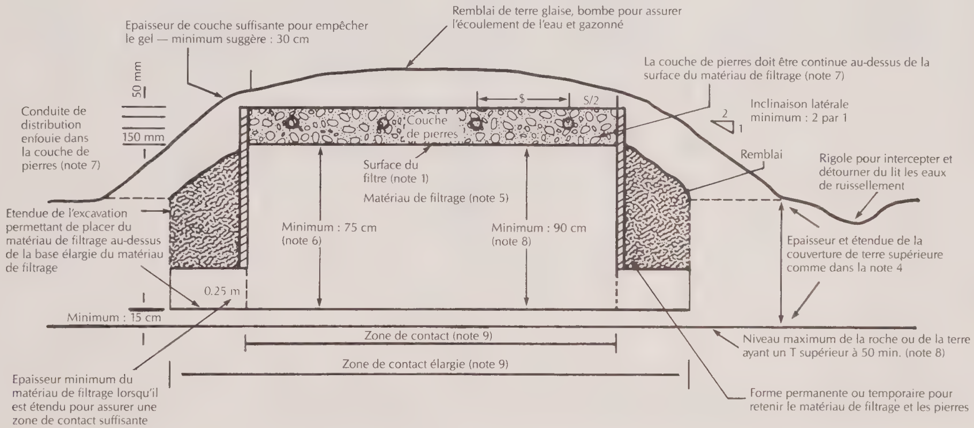
LEACHING BEDS
TYPICAL SAND FILTER

Schéma Nº 4

FILTRE À SABLE TYPE

(Adaptable pour être utilisé avec les systèmes d'égout aussi bien de la classe IV que de la classe VI)





NOTES

Se referer au règlement de l'Ontario 374/81 (articles 10 et 12) pour les exigences concernant les lits d'épandage du type filtre à sable.

1. Zone maximum de la surface du filtre : 50 m².
2. Chargement des filtres autorisé :

Installations d'égout de la classe IV	75 L/m²par jour pour des écoulements de moins de 3 000 L par jour. 50 L/m² par jour pour des écoulements de 3 000 L par jour à 5 000 par jour.
Installations d'égout de la classe VI	150 L/m² par jour pour des écoulements de moins de 6 000 par jour. 100 L/m² par jour pour des écoulements de 6 000 L par jour à 10 000 L par jour.

3. L'écoulement quotidien maximum des eaux usées d'un système d'égout dans lequel le lit d'épandage peut être du type filtre est de 5 000 L pour un système d'égout de la classe IV et de 10 000 L pour un système d'égout de la classe VI. Lorsque l'écoulement est au maximum dans chacun de ces cas, il faut prévoir deux filtres de 50 m².
4. Le matériau de filtrage doit être placé sur une couverture de terre dont le T n'est pas supérieur à 50 min./cm et que s'étend au-délà de la zone de contact du filtre (note 9) à une profondeur d'au moins 25 cm sur une distance d'au moins 15 m à partir de la conduite de distribution extérieure dans toute direction d'écoulement latéral des effluents à partir du filtre.
5. On ne peut utiliser que le matériau de filtrage repondant aux critères de composition acceptés par le ministère de l'Environnement.
6. L'épaisseur minimum du matériau de filtrage spécifié est de 75 cm.
7. La conduite doit être enfouie dans une couche de pierres constituée soit par des granulats non amalgamés de 19 mm débarrassés par lavage de tout matériau fin soit par du gravier propre doit les dimensions se situent entre 19 mm et 53 mm après tamisage.
8. La surface du matériau du filtre à sable recevant les eaux usées doit être située au moins à 90 cm au-dessus de la roche ou de la terre ayant un T supérieur à 50 min./cm et au moins à 50 cm au-dessus du niveau maximum de la nappe.
9. La zone de contact entre le matériau de filtrage et la terre sous-jacente ne doit pas être inférieure à la zone A = QT/850. Q étant l'écoulement quotidien en litres des eaux usées et T le temps de percolation de la terre sous-jacente.

LITS D'ÉPANDAGE

FILTRE À SABLE TYPE

SEPTIC TANK SYSTEMS

A septic tank should not be closer than:

- 15 metres to any well, lake, river, stream, water course, pond, spring or reservoir.
- 1.5 metres to any building or structure.
- 3 metres to any property boundary.

The distribution pipe in a leaching bed shall not be closer than:

- 15 metres to a well with a watertight casing to at least 6 metres below ground.
- 30 metres to a spring used as a source of potable water or a well other than a well with a watertight casing to a depth of at least 6 metres.
- 5 metres to any building or structure.
- 3 metres to any property boundary.
- 15 metres to a lake, river, pond, stream or reservoir or to a spring not used as a source of potable water.
- The distribution pipe clearance listed above must be increased in any direction in which the surface of the leaching bed is raised above natural grade. The increase is 2 metres for each 1 metre raised.

The above distances are minimum according to the regulation and may have to be increased to prevent pollution if soil or other site conditions so dictate.

ABSORPTION TRENCH LEACHING BEDS
LENGTH OF DISTRIBUTION PIPE IN METRES FOR VARIOUS DESIGN SOIL PERCOLATION TIMES (T) FOR PRIVATE DWELLINGS

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Number of Bedrooms	T from 1 to 5 min. inclusive	T greater than 5 min. but not greater than 10 min.	T greater than 10 min. but not greater than 15 min.	T greater than 15 min. but not greater than 20 min.	T greater than 20 min. but not greater than 25 min.	T greater than 25 min.
2 or less	40	40	70	100	130	5.5T
3	40	60	100	140	180	8 T
4	40	80	130	180	230	10T
for each bedroom over 4 add	5	12	20	27	35	1.5T

NOTES: This table is for domestic systems only. It does not apply to schools, motels, hospitals or other such public or commercial premises.

MINIMUM AREA OF THE SURFACE OF THE FILTER MEDIUM IN FILTER TYPE LEACHING BEDS FOR PRIVATE DWELLINGS–SEPTIC TANK SYSTEMS

NUMBER OF BEDROOMS	MINIMUM SURFACE AREA OF FILTER MEDIUM–SQUARE METRES
2 or less	15
3	22
4	28
For each bedroom over 4 add	4

LES SYSTÈMES À FOSSE SEPTIQUE

Une fosse septique ne doit pas se trouver à moins de :
- 15 mètres d'un puits, d'un lac, d'une rivière, d'un cours d'eau, d'un ruisseau, d'un étang, d'une source ou d'un réservoir;
- 1,5 mètre d'un bâtiment ou d'un ouvrage;
- 3 mètres des limites d'une propriété.

Les conduites du lit d'épandage ne doivent pas se trouver à moins de :
- 15 mètres d'un puits pourvu d'un cuvelage étanche jusqu'à 6 mètres au moins sous la surface du sol;
- 30 mètres d'une source utilisée pour l'approvisionnement en eau potable ou d'un puits non pourvu d'un covelage étanche jusqu'à 6 mètres au moins sous la surface du sol;
- 5 mètres d'un bâtiment ou d'un ouvrage;
- 3 mètres des limites d'un propriété;
- 15 mètres d'un lac, d'une rivière, d'un étang, d'un cours d'eau ou d'un réservoir ou d'une source non utilisée pour l'approvisionnement en eau potable.
- L'espacement prévu pour les conduites devra être augmenté dans toute direction où la surface du lit d'épandage est surélevée par rapport au niveau naturel du sol. L'augmentation sera de 2 mètres par mètre de surélévation.

Ces espacements sont les minimums prescrits par le règlement et devront être augmentés pour prévenir la pollution si l'état du sol ou d'autres facteurs l'exigent.

LITS D'ÉPANDAGE À TRANCHÉES D'ABSORPTION
LONGUEUR EN MÈTRES DE LA CONDUITE DE DISTRIBUTION À RACCORDER À UN BÂTIMENT RÉSIDENTIEL, POUR DIVERS TEMPS DE PERCOLATION (T) THÉORIQUES

COLONNE 1	COLONNE 2	COLONNE 3	COLONNE 4	COLONNE 5	COLONNE 6	COLONNE 7
Nombre de chambres à coucher	T de 1 à 5 min. inclusiv.	T supérieur à 5 min. mais non supérieur à 10 min.	T supérieur à 10 min. mais non supérieur à 15 min.	T supérieur à 15 min. mais non supérieur à 20 min.	T supérieur à 20 min. mais non supérieur à 25 min.	T supérieur à 25 min.
2 ou moins	40	40	70	100	130	5,5T
3	40	60	100	140	180	8T
4	40	80	130	180	230	10T
Plus de 4 : ajouter pour chaque chambre en plus	5	12	20	27	35	1,5T

REMARQUE : Ce tableau ne concerne que les systèmes raccordés à des bâtiments résidentiels, et non conçus pour des écoles, des motels, des hôpitaux et d'autres bâtiments publics ou commerciaux.

SUPERFICIE MINIMALE DU MATÉRIAU DE FILTRAGE DANS LES LITS D'ÉPANDAGE À COUCHE FILTRANTE POUR LES BÂTIMENTS RÉSIDENTIELS – SYSTÈMES À FOSSE SEPTIQUE

NOMBRE DES CHAMBRES À COUCHER	AIRE MINIMALE DU MATÉRIAU DE FILTRAGE EN MÈTRES CARRÉS
2 ou moins	15
3	22
4	28
Plus de 4 : ajouter pour chaque chambre en plus	4

CARE & MAINTENANCE OF A SEWAGE SYSTEM

***Warning:** Under no circumstances should a homeowner enter a septic tank. Noxious gases which are heavier than air remain in the tank after the top is removed, and have caused death both to the original victim and to those who attempt to rescue him from the tank.*

A septic tank and tile bed should, with proper care and maintenance, provide many years of service. There are, however, some things which you, the homeowner should be aware of that will help the system to function properly. These are:

1. Do not allow root drains to discharge to the septic tank or surface waters to drain towards the area of the leaching bed.
2. Water usage in the home should be kept to a minimum. If automatic washers and dishwashers are used make sure full loads are washed each time. Excessive use of water (such as doing numerous washings in one day) could flush solids from tank to the leaching bed.
3. Moderate use of household drain solvents, cleaners, disinfectants, etc., should not interfere with the operation of the sewage disposal system, however, indiscriminate use may cause problems.
4. There should be no need to use "starters", "bacterial feeds" or "cleaners".
5. The septic tank should be inspected at least once every two years and the tank pumped out when necessary – every three or four years is suggested. Failure to pump-out a septic tank when required may result in sludge or scum being carried over to the leaching bed resulting in soil clogging and complete failure of the system.
6. Vehicular traffic (including snowmobiles) should not be allowed over the leaching bed.
7. The area over a leaching bed should have a good cover of grass but shrubs or trees should not be planted over the area. Good ventilation and adequate sunlight should be maintained in the area of the leaching bed.

IN THE INTEREST OF HEALTH AND THE PROTECTION OF THE ENVIRONMENT, ANY MALFUNCTION OF A SEPTIC TANK SHOULD BE PROMPTLY REPORTED TO THE LOCAL HEALTH UNIT OR MINISTRY OF ENVIRONMENT OFFICE.

Septic Tank Maintenance Record

Date	Nature of work (pumped out, general inspection, remedial work (specify)	Name of company and person carrying out the work or inspection

UTILISATION ET ENTRETIEN D'UNE FOSSE SEPTIQUE

AVERTISSEMENT : *On ne doit en aucun cas pénétrer dans une fosse septique car celle-ci continue à dégager des gaz nocifs même quand le couvercle a été retiré. Plusieurs personnes qui se sont infiltrées dans une fosse sont mortes asphyxiées.*

Si elle est bien utlisée et entretenue, l'installation septique devrait durer des années. Il y a cependant un certain nombre de précautions que vous devriez connaître pour qu'elle fonctionne correctement.

1. Évitez que les eaux des gouttières ne se déversent dans la fosse, et empêchez les eaux de surface d'atteindre le lit d'épandage.
2. Utilisez le moins d'eau possible. Si vous possédez une machine à laver automatique ou un lave-vaisselle, servez-vous-en à pleine capacité. Si vous utilisez trop d'eau (par exemple, en effectuant de nombreuses lessives le même jour), celle-ci pourrait chasser les matières solides de la fosse et les entraîner vers le lit d'épandage.
3. Les solvants, nettoyants, désinfectants ou autres produits ménagers utilisés avec modération ne devraient pas nuire à la fosse. Leur usage abusif pourrait cependant causer des problèmes.
4. Il n'est pas nécessaire d'utiliser des additifs, des semences bactériennes ou des agents nettoyants.
5. Il faut faire inspecter la fosse au moins tous les deux ans et la faire vidanger au besoin; on recommande d'effectuer une vidange tous les trois ou quatre ans. Si on ne vide pas la fosse en temps voulu, les boues et l'écume risquent de se déverser dans le lit d'épandage et de le colmater, rendant le système inutilisable.
6. On doit éviter de laisser passer des véhicules sur le lit d'épandage (cela vaut aussi pour les motoneiges).
7. La surface du lit d'épandage doit être recouverte d'une bonne couche d'herbe ou de gazon, mais on évitera d'y planter des arbres et des arbustes. Si elle est bien aérée et bien exposée au soleil, l'humidité du sol pourra s'évaporer plus facilement.

DANS L'INTÉRÊT DE LA SANTÉ PUBLIQUE ET DE L'ENVIRONNEMENT, SIGNALEZ TOUTE DÉFAILLANCE SANS DÉLAI AU SERVICE DE SANTÉ PUBLIQUE OU À ENVIRONNEMENT ONTARIO.

FICHE D'ENTRETIEN D'UNE FOSSE SEPTIQUE

Date	Nature des travaux (vidange, inspection générale, réparation – préciser)	Nom de la personne qui a effectué les travaux, et compagnie qu'elle représente

ENVIRONMENT
INFORMATION
ENVIRONNEMENT

DECEMBER 1990

Environment
Environnement
Ontario

DÉCEMBRE 1990

PROPOSED CHANGES TO ONTARIO'S ENVIRONMENTAL ASSESSMENT PROGRAM

In December 1990, Environment Ontario released "Toward Improving the Environmental Assessment Program in Ontario," a discussion paper on environmental assessment (EA). The discussion paper was prepared by the ministry, in consultation with a wide-range of interested parties. The following puts this work in context. Highlights of the discussion paper are also outlined.

THE ENVIRONMENTAL ASSESSMENT ACT

Ontario's Environmental Assessment (EA) Act has been in effect since 1976, to protect, conserve and ensure wise management of the environment. The Act helps guarantee that the environment is considered in the planning and decision-making processes for future undertakings. Indeed, the EA Act and program have generated a number of significant benefits:

- improved planning and decision-making practices and procedures;
- increased opportunities for public involvement and input into the decision-making process;

MODIFICATIONS QU'ON SE PROPOSE D'APPORTER AU PROGRAMME D'ÉVALUATION ENVIRONNEMENTALE DE L'ONTARIO

En décembre 1990, Environnement Ontario publiait un document de travail sur les évaluations environnementales intitulé Vers une amélioration du Programme d'évaluation environnementale en Ontario. Ce document a été préparé par le Ministère, en consultation avec diverses parties intéressées. Voici le contexte dans lequel ce travail s'est effectué et les points saillants du document.

LA LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES

La Loi sur les évaluations environnementales de l'Ontario, en vigueur depuis 1976, vise à protéger et à préserver l'environnement, ainsi qu'à en assurer une gestion avisée. Elle contribue à garantir la prise en compte de l'environnement dans les processus de planification et de prise de décisions relatifs à de futures entreprises. En fait, grâce à la Loi et au programme, des améliorations importantes ont été apportées. Ainsi :

- les modes et processus de planification et de prise de décisions sont plus efficaces;
- le public a davantage d'occasions de participer activement au processus décisionnel;

- consideration of a wider range of alternatives, thus encouraging broader thinking and innovative approaches to problems and opportunities;

- improved accountability in decision-making; and

- improved environmental protection--by minimizing adverse effects which may have otherwise ocurred.

Though the Act and its underlying principles are sound, concerns about the EA process--the implementation of the Act--have been raised. The Government of Ontario's response to these concerns is outlined below.

SEEKING IMPROVEMENTS

In 1988, Environment Ontario began a comprehensive review of Ontario's environmental assessment process. The Environmental Assessment Program Improvement Project (EAPIP) was established with a dual purpose: to examine the understanding and acceptance of environmental assessment in Ontario, and to make recommendations to ensure that the EA program operates as effectively and efficiently as possible.

During phase one, EAPIP evaluated proposals for minor administrative improvements to the EA Act, based on public input as well as Environment Ontario experience in administering the Act. Two advisory groups, the Public Advisory Group and the Inter-Ministerial Liaison Committee, were established to assist EAPIP in developing a series of working papers on related topics. The Public Advisory Group includes members from a variety of interested groups, including but not limited to environmental groups, from outside the provincial government. Representatives from most government of Ontario ministries sit on the Inter-Ministerial Liaison Committee.

Following submission of EAPIP's phase one report in August, 1989, the previous Minister of the Environment asked the Environmental Assessment Advisory Committee (EAAC) to conduct a public review and provide comment on the reports' recommendations. The Advisory Committee, consisting of three independent members appointed by the minister, was established in 1983 to increase public input

- on envisage un plus grand nombre de solutions de rechange, ce qui encourage les parties concernées à élargir la réflexion et à aborder les problèmes et possibilités de manière novatrice;

- l'imputabilité des décideurs est accrue; et

- l'environnement est mieux protégé, car les effets nuisibles possibles sont minimisés.

Bien que la Loi et les principes qui la sous-tendent soient valables, le processus d'évaluation environnementale, c'est-à-dire la mise en oeuvre de la Loi, a suscité des inquiétudes, auxquelles le gouvernement de l'Ontario a répondu comme suit.

LA QUÊTE D'AMÉLIORATIONS

En 1988, Environnement Ontario a entrepris un examen détaillé du processus d'évaluation environnementale appliqué dans la province. Le Projet d'amélioration du programme d'évaluation environnementale (PAPÉE) a été créé à deux fins : étudier la façon dont les évaluations environnementales sont comprises et acceptées en Ontario, et formuler des recommandations visant à assurer que le programme fonctionne aussi efficacement que possible.

Dans un premier temps, l'équipe du PAPÉE a évalué de petites améliorations administratives qu'on se proposait d'apporter à la Loi à la lumière d'idées émises par le public et de l'expérience du Ministère en matière d'application de la Loi. Deux groupes consultatifs, le Groupe consultatif public et le Comité de liaison interministériel, ont été créés pour aider à l'élaboration d'une série de documents de travail sur des sujets connexes. Le Groupe consultatif public réunit des membres de divers groupes concernés n'appartenant pas au gouvernement provincial, groupes environnementalistes y compris. Des représentants de la plupart des ministères ontariens siègent au Comité de liaison interministériel.

Après la présentation du rapport de première étape du PAPÉE, en août 1989, l'ancien ministre de l'Environnement a demandé au Comité consultatif des évaluations environnementales de tenir un examen public et de commenter les recommandations contenues dans le rapport. Le Comité consultatif, composé de trois membres indépendants

into the minister's decisions on matters relating to the EA Act. As a result of EAAC's recommendations, the ministry incorporated phase one consideration into an expedited comprehensive review process conducted by a ministry task force.

THE ENVIRONMENTAL ASSESSMENT TASK FORCE

In October 1989, the Environmental Assessment (EA) Task Force was formed within the ministry to enhance and expedite the review of Ontario's environmental assessment process, and to finalize the work begun by EAPIP. After consultation with government agencies, a Public Advisory Group, a Inter-Ministerial Liaison Committee, environmental and other concerned groups, the EA Task Force has produced a discussion paper, "Toward Improving the EA Program in Ontario." The paper integrates the work done by EAPIP and includes a comprehensive set of recommendations. These include specific changes to the EA Act and process to increase effectiveness and efficiency. The paper also examines the application of the Act beyond its current use.

Highlights of the recommendations contained in the discussion paper include:

- the recommendation that a planning and consultation phase become a mandatory part of the EA process;
- the provision for scoping during the planning and consultation phase and hearings, if required;
- clarification of roles and responsibilities of those involved in the EA process and the development of criteria to assist in decision-making;
- the recommendation that time limits be established for review and decision process;
- clarification of the administrative process under the EA Act, including the Class EA process, designations and exemptions; and
- the recommendation that the Environmental Assessment Board revise its Rules of Practice and Procedure to improve the hearing process.

nommés par le ministre, a été créé en 1983 afin de permettre au public de participer davantage aux décisions du ministre sur toute question se rapportant à la Loi. Ä la suite des recommandations du CCÉE, le ministre a intégré les considérations de la première étape dans un processus accéléré d'examen détaillé, qui a été confié à un groupe de travail du Ministère.

LE GROUPE DE TRAVAIL SUR LES ÉVALUATIONS ENVIRONNEMENTALES

En octobre 1989, le Groupe de travail sur les évaluations environnementales a été constitué au sein du Ministère afin d'examiner rapidement et d'améliorer le processus d'évaluation environnementale de l'Ontario et de terminer le travail commencé dans le cadre du PAPÉE. Après avoir consulté des organismes gouvernementaux, le Groupe consultatif public, le Comité de liaison interministériel, des groupes environnementalistes et d'autres groupes concernés, le Groupe de travail a rédigé un document intitulé Vers une amélioration du Programme d'évaluation environnementale en Ontario. Ce document, qui tient compte des travaux réalisés dans le cadre du PAPÉE, présente un ensemble de recommandations détaillées. Celles-ci portent notamment sur des modifications précises à apporter à la Loi et au processus d'évaluation environnementale pour en accroître l'efficacité et l'efficience. Le document envisage également l'application de la Loi au-delà de sa portée actuelle.

Il est recommandé dans le document de travail :

- que le processus d'évaluation environnementale incorpore une phase de planification et de consultation;
- que soient prévues une séance de délimitation durant la planification, la consultation et la tenue d'audiences, au besoin;
- que soient précisés les rôles et les responsabilités des intervenants dans le processus d'évaluation environnementale et qu'on élabore des critères pour faciliter la prise de décisions;
- que soient fixés des délais pour le processus d'examen et d'autorisation;

PUBLIC INPUT

The government discussion paper was released in December 1990 for public review. After all interested parties have had the opportunity to review the paper, the Environmental Assessment Advisory Committee will conduct public consultations to obtain comment on the paper and will report its findings to the environment minister. The Committee's findings will be considered before any changes to the EA Act are introduced in the Legislative Assembly.

- que les processus administratifs prévus par la Loi sur les évaluations environnementales soient précisés, y compris l'évaluation environnementale de portée générale, les désignations et les exemptions; et

- que la Commission des évaluations environnementales réexamine son Règlement intérieur en vue d'améliorer le processus d'audience.

LA PARTICIPATION DU PUBLIC

Le document de travail du gouvernement a été rendu public en décembre 1990. Quand toutes les parties intéressées auront eu la possibilité de l'examiner, le Comité consultatif des évaluations environnementales consultera le public pour recueillir ses observations et il fera part de ses conclusions au ministre de l'Environnement. Les conclusions du Comité seront prises en compte avant que toute modification à la Loi sur les évaluations environnementales ne soit déposée devant l'Assemblée législative.

ENVIRONMENT

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FEBRUARY 21, 1991

Ontario Environment Environnement

ONTARIO'S WASTE REDUCTION ACTION PLAN:

BACKGROUNDER

ONTARIO'S DIMINISHING CAPACITY TO DISPOSE OF WASTE

- There are 1,400 landfill sites in Ontario. About 100 landfill sites are expected to reach capacity by 1993. An other 150 landfill sites are expected to reach their capacity between 1993 and 2003.

- Between 1991 and 1994, Ontario faces the loss of about 45 per cent of its annual landfill capacity because three of the province's largest landfill sites are expected to close: Britannia Road (750,000 tonnes per year) in Peel Region, Brock West (964,000 tonnes per year) in Durham Region and Keele Valley (2.2 million tonnes per year) near Maple, north of Toronto.

WASTE GENERATION IN ONTARIO

- Ontario's residents and industries produce about 10 million metric tonnes of municipal solid waste in total per year. That is about one tonne of waste per capita per year. The per capita figure has remained steady since 1987.

- The increase in the volume of waste generated to 10 million tonnes per year in 1989 (the last year for which figures are available) from 9.2 million tonnes per year in 1987 is due to population and economic growth.

- The residential sector is responsible for about 40 per cent of the total municipal solid waste. The industrial, commercial and institutional (ICI) sector is responsible for 60 per cent of the total municipal solid waste.

THE COMPOSITION OF ONTARIO'S WASTE

Residential Sector

Percentage by weight (1987)	Category	Examples
31.6	Organics	Kitchen and yard wastes
29.2	Paper	Newspapers, fine paper, magazines telephone books, tissue, etc.
19.5	Packaging	Boxboard, corrugated cardboard, glass, steel, aluminum and plastic containers
11.6	Other	Textiles, leather, rubber, pet litter, ceramics, etc.
2.8	Diapers	
2.5	White goods	Stoves, refrigerators
1.6	Demolition and construction materials	
1.2	Wood	

Industrial, Commerical and Institutional (ICI) Sector

Percentage by weight (1987)	Category	Examples
23.0	Cardboard	
22.0	Other	Textiles, leather, ceramics, rubber, misc. ferrous and plastic products
19.0	Wood	Pallets, misc. wood material
13.0	Paper	Newsprint, fine paper, magazines, telephone books, etc.
10.0	Metal	Steel, aluminum, iron, etc.
5.0	Organics	Food and yard wastes
5.0	Glass	
3.0	Plastic	

Total Municipal Solid Waste

Combined waste streams fron the residential and ICI sectors.

Percentage by weight (1987)	Category	Examples
43.0	Other	Textiles, leather, rubber, white goods, misc. ferrous and plastic products
21.0	Packaging	Boxboard, corrugated cardboard, glass, metal, plastic, and aluminum containers
20.0	Paper	Newsprint, fine paper, telephone books, tissue, etc.
16.0	Organics	Food and yard wastes

THE THREE RS OF WASTE MANAGEMENT

- The first "R" is reduce, or simply to reduce the quantity of waste produced. Some examples include consumers avoiding the purchase of disposable and over-packaged goods, and industries changing production processes to generate fewer unusable by-products.

- The next "R" is reuse, or to use an item again in its original form for the same or a different purpose. Some examples include refillable bottles, cloth diapers and rechargeable batteries. Voluntary and private sector organizations also accept used goods for restoration and resale.

- The third "R" is recycling or the extraction of waste materials to meet a market demand through systems such as source separation (for example, Blue Box programs), community composting, and the processing of mixed waste to recover useful materials.

ONTARIO'S WASTE DIVERSION OBJECTIVES

- The Ontario government's goal is to divert at least 25 per cent of all household, industrial and commercial waste form disposal to productive uses through the 3Rs of waste management by 1992; and at least 50 per cent by the year 2000.

CURRENT WASTE REDUCTION FUNDING SUPPORT PROGRAMS OF THE MINISTRY OF THE ENVIRONMENT

- Ontario's municipalities have the primary responsibility for managing municipal solid waste including 3Rs, planning, collection and disposal. The provincial government is responsible for setting and enforcing standards, guidelines and policies on all aspects of waste management including 3Rs, treatment and disposal; providing financial and technical assistance to municipalities for improved waste management facilities and 3Rs programs.

- The provincial government will have granted $41.7 million to municipalities and industries to support their 3Rs programs during the current fiscal year, ending March 31, 1991.

Blue Box Recycling

- Blue Box recycling programs reach more than two million of the 3.7 million households in Ontario. In 1989, a total of 107 recycling projects in 340 municipalities were sponsored by the government. In 1990-1991, the ministry will spend more than $21 million on municipal recycling grants.

Home Composter Programs

- The ministry has approved funding for more than 240,000 home composters in 90 municipalities. To date the ministry has committed $5.0 million to fund 50 per cent of the cost of each composting unit. A further $6 million was allocated for fiscal year 1990-1991. The number of home composters used by householders is expected to double in the next year.

Student Action for Recycling (STAR)

- STAR is a $10 million program funded by the ministry and available to all school boards to help set up recycling programs in schools. To date 12 school boards with 628 schools have been approved for grants.

Industrial Waste Diversion Program

- The Industrial Waste Diversion Program provides technical and financial help to industries and institutions in their 3Rs projects. To help promote markets the ministry provides funding to collectors and users of waste materials. More than 200 industrial 3Rs projects have been approved for funding. In fiscal year 1990-1991, the ministry will provide more than $14 million towards these projects.

- The ministry also supports the Ontario Waste Exchange (OWE) and its national counterpart the Canadian Waste Exchange (CWE). The OWE acts as a waste broker matching producers of industrial waste to companies that may reuse the waste material. The CWE publishes listings in a bi-monthly bulletin so that companies may arrange exchanges.

CURRENT WASTE DIVERSION RATE

- The Ministry of the Environment estimates that 5.9 per cent of the municipal solid waste was diverted from disposal in 1990 by various municipal, industrial and school 3Rs programs.

ONTARIO'S WASTE REDUCTION ACTION PLAN

Strategy

- The implementation of strong regulatory measures to reduce at the source the flow of valuable resources which now go to disposal.

- The development of the financial and technical systems needed to divert these materials from landfill sites to productive use and reuse.

- The encouragement of healthy markets for materials recovered through source separation programs.

- The development of public education programs that will provide all people in Ontario with the information they need to make responsible choices to reduce waste.

Regulatory Initiatives

Industrial/Commercial/Institutional (ICI) Source Separation:

- Goal: To help meet provincial waste diversion targets by making source separation mandatory at major industries, businesses and institutions.

- The ministry will introduce a regulation that will make source separation mandatory among major ICI waste generators for selected recyclable materials. They are:

ICI generators of waste	Selected recyclable materials
Retail malls	Corrugated cardboard, aluminum, steel, glass
Construction and demolition sites	Wood, drywall and steel
Office complexes	Fine paper, glass, aluminum, corrugated cardboard
Hospitality sector e.g. hotels and restaurants	Aluminum, steel, newspaper, glass
Institutional sector e.g.hospitals and nursing homes	Newspaper, aluminum, steel and glass
Manufacturing industries	Industry specific materials determined by more waste audits

Waste Audits and Work Plans:

- Goal: To help industries, businesses, institutions and municipalities evaluate opportunities for diverting waste and monitor their progress.

- A waste audit will examine how waste is generated from the broadest perspective including procurement practices, waste generating processes, reduction, reuse and recycling potential, product life cycle and packaging. The ministry will release a draft regulation in the fall of 1991 for public review and consultation. Under this regulation, major ICI operators will be required to conduct waste audits of their operations and to develop work plans for setting timetables for implementing reductions.

- In 1992, the ministry will introduce legislation requiring major users of packaging materials, including food packaging, beverage containers, chemical manufacturing and paper and allied products to conduct similar audits and work plans. Any packaging which is not covered by these plans would accepted in this province.

Municipal Source Separation:

- Goal: To make residential recycling mandatory in all large municipalities.

- The ministry will introduce legislation which will make residential recycling mandatory in all large municipalities. The Blue Box program will expand to include apartments, townhouses and rural depots. The ministry will establish a baseline of recyclable materials. These may include corrugated cardboard, newspaper, aluminum, steel, glass, PET (polyethylene terephthalate) plastic, leaf and yard wastes.

- A draft regulation will be available for public review and consultation in the fall of 1991. The regulation will go into effect in early 1992. At that time, the ministry will release an implementation schedule for southern Ontario and a more gradual timetable for northern Ontario.

Community Leaf and Yard Composting:

- Goal: To reduce the amount of organic material now going to landfill sites.

- Community composting facilities to accept and to process leaves and yard waste will be mandatory within the year in all municipalities.

Market Development:

- Goal: To develop an aggressive marketing strategy by February 1992 to encourage a strong and sustained demand for source separated, used material.

- The ministry will consult other government agencies and other levels of government as well as industry, labor, business, environmentalists and economists on the marketing strategy..

- The ministry will examine the impact of government purchasing policies and economic incentives and disincentives, including taxation and co-operative efforts to encourage consumer preference and demand for recycled content in products.

Environmental Approvals for 3Rs Projects

- Goal: To make environmental approvals for waste recycling facilities more efficient while retaining essential environmental controls.

- Under Part V of the *Environmental Protection Act*, all public and private sector proponents of waste management facilities, including waste reduction facilities, must satisfy certain environmental, health and safety requirements specific to the site in order to obtain a Certificate of Approval.

- The ministry will clarify and improve the approvals process set out in Part V, *EPA* for 3Rs facilities. The approvals process would be improved by introducing two categories of facility:
  a. Recyclable materials - On-going manufacturing and other processes that employ used materials instead of raw materials will fit within this category. These facilities will be completely exempt from Part V approvals of the *EPA*. Examples include manufacturers such as steel mills using scrap steel and pulping plants using waste paper.

b. Permit by Rule - Facilities that receive source separated materials for additional sorting, processing or other treatments prior to using them as recyclable materials will be approved through the Permit by Rule provisions. Such sites would be given exemptions from individual *EPA* Part V approvals on condition they were established in strict compliance with sets of general rules which the ministry would prepare for each type of activity. Examples include Blue Box sorting sites and composting sites. Community involvement in decision-making would remain a feature of locating any such sites.

- Full approval still would be required for facilities that receive mixed wastes for storage, treatment, sorting or other management prior to disposal or reuse or recycling. Examples include mixed waste composting sites, transfer stations, landfill sites and household hazardous waste depots.

- Draft amendments and other information will be available for public consultation in the fall of 1991 and will go into effect in 1992.

Public Education and Outreach

- Goal: To provide information, education, training and technical assistance on waste reduction to schools, municipalities, industries and householders.

- Community outreach programs that help to change the public's values and attitudes about consumption and waste. Such programs may include information on how to reduce waste at home and at work, on household hazardous waste and on waste reduction projects such as home composters.

- School outreach programs to provide information about waste and waste diversion, and in particular, to provide course material on the environment which will meet Ministry of Education requirements.

- Technical outreach programs designed for municipal, industrial and institutional plant managers, engineers and consultants as well as trade associations and those engaged in research and development. These programs may include information about waste audits, work plans and recycling and diversion programs.

Waste Reduction by the Provincial Government

- Goal: To reduce solid waste generated by the provincial government according to provincial waste diversion targets; to help support secondary materials markets with appropriate procurement policies; and to provide a model for other ICI waste generators.

- The Ministry of Government Services is preparing a report on how the government may reduce its waste. The Ministry of the Environment is conducting an environmental audit on its activities. The Ministry of Consumer and Commercial Relations is setting out a deposit/refund program for the Liquor Control Board of Ontario.

Financial Assistance Programs

Municipal 3Rs Programs:

- Provincial funding support will be reviewed with special emphasis upon enhancement to the blue box program.

Industrial 3Rs Programs:

- Program delivery will be improved to speed up the approvals of proposals.

The Ontario Waste Reduction Office

- Mandate: To co-ordinate policy and regulatory development and to consult with all groups affected by the Ontario Waste Reduction Action Plan.

- Drew Blackwell has been appointed to head the office. He will report directly to the Deputy Minister of the Environment.

Future Initiatives

- The ministry is looking at province-wide bans from landfill sites of all recyclable materials for which markets exist or can be developed.

- The ministry is considering recommendations for province-wide backyard composting.

- The Ministries of the Environment and Treasury and Economics are examining ways of bringing in a true cost accounting pricing system for municipal solid waste management systems. True cost accounting looks at the cost of planning, siting, opening, operating and closing landfill sites as well as the cost of providing long-term security at and around them. It then compares these costs to the tipping fees and other waste recovery methods as well as the amount which municipalities budget for collecting garbage. True cost accounting also takes into account the cost of waste diversion and recycling programs.

- The ministry is looking at the possibility of setting a minimum tipping fee for publicly-owned landfill sites. (A tipping fee is a charge for receiving and managing waste at an approved facility. The fee is usually based on either weight or volume of the waste to be managed.) A portion of this fee could be put into a municipal reserve fund for 3Rs and other waste diversion programs.

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PIBS 1600E
06/91

ENVIRONMENT INFORMATION - ENVIRONNEMENT

SUMMER 1991 | Ontario Environment Environnement | ÉTÉ 1991

PUBLIC REVIEW OF NEW DRINKING WATER GUIDELINE FOR NDMA

The minister has referred the Expert Committee Report and Ministry rationale for the 9ppt Interim Maximum Acceptable Concentration (IMAC) to Ontario's Advisory Committee on Environmental Standards to consult with the public and recommend a final Maximum Acceptable Concentration (MAC).

WHAT IS NDMA?

NDMA (N-Nitrosodimethylamine) is a chemical compound known to cause cancer in a wide variety of animal species, and may cause cancer in humans.

An odorless, tasteless, yellow, oily liquid at room temperature, NDMA is no longer produced for commercial purposes. However, it is an inadvertent byproduct of the chemical processes used in some industries such as rubber manufacturing, leather tanning, pesticide manufacturing and food processing, and as a result may be found in sewage treatment plant effluent.

OCCURRENCE IN ONTARIO

In November, 1989, the Ministry's Drinking Water Surveillance Program (DWSP) detected the first high concentration of NDMA in drinking water in Ontario at

EXAMEN PUBLIC DU NOUVEAU CRITÈRE DE QUALITÉ DE L'EAU POTABLE POUR LA NDMA

La ministre a transmis le rapport du comité d'experts et la justification du seuil de 9 ppt au Comité consultatif des normes environnementales de l'Ontario qui sollicitera l'avis du public et recommandera une concentration maximale admissible (CMA).

QU'EST-CE QUE LA N-NITROSODIMÉTHYLAMINE (NDMA)?

La N-nitrosodiméthylamine est un composé chimique dont on connaît le pouvoir cancérogène chez une grande variété d'espèces animales; ce composé pourrait même être une cause de cancer chez les humains.

Liquide jaune inodore, insipide et huileux à la température de la pièce, la N-nitrosodiméthylamine n'est plus fabriquée à des fins commerciales. Elle reste cependant un dérivé insidieux des procédés chimiques utilisés dans certaines industries, notamment celles du caoutchouc, du tannage du cuir, de la fabrication de pesticides et de la transformation des aliments. On en retrouve donc dans les effluents des usines d'épuration des eaux d'égout.

Elmira. No NDMA was detected in similar DWSP studies at over 40 locations across Ontario.

An Interim Maximum Acceptable Concentration (IMAC) of 14 ppt (parts per trillion) was adopted by the Ministry to reduce NDMA discharges and issue a control order to Uniroyal Limited -- making Ontario the first province in Canada to adopt such a guideline. The 14 ppt IMAC, based on readily available NDMA information, was a temporary measure taken to reduce discharges until a more in-depth analysis could be conducted.

The Ministry has continued monitoring drinking water supplies in the Grand River System serving Waterloo, Kitchener, Brantford and smaller communities along the river which empties into Lake Erie near Dunnville.

INTERIM MAXIMUM ACCEPTABLE CONCENTRATION (IMAC)

IMAC is a term used to describe limits for substances of concern with known chronic effects in humans and animals and for which there are no established maximum acceptable concentrations. When a substance is detected above the IMAC level, it signals the need for more sampling, investigation and corrective action on a case-by-case basis.

EXPERT COMMITTEE REVIEWS NDMA EXPOSURE\RISK

An Expert Committee was established by the Ministry in May, 1990, to identify potential guideline numbers and associated risk levels based on health considerations. All pathways of exposure to NDMA - via air, water, soil, diet and consumer products - were evaluated.

The health risk of NDMA exposure at various levels over a lifetime (incremental lifetime cancer risk) was assessed.

The Expert Committee included representatives from the Ministries of Environment, Health and Labour, and the Regional Municipality of Waterloo. Its report has assisted the Ministry in selecting a more appropriate IMAC for drinking water.

INCIDENCE EN ONTARIO

C'est en novembre 1989, à Elmira, qu'on a décelé, dans le cadre du Programme de surveillance de la qualité de l'eau potable du Ministère, la première concentration élevée de NDMA dans l'eau potable de la province. Aucune autre trace de NDMA n'a été relevée lors d'enquêtes menées dans plus de 40 localités de la province dans le cadre du même programme.

Le ministère de l'Environnement a adopté une concentration maximale admissible provisoire (CMAP) de 14 parties par billion (ppt) dans le but de réduire les rejets de NDMA et de délivrer un arrêté d'intervention à la société Uniroyal Limited, ce qui fait de l'Ontario la première province canadienne à adopter une telle directive. La CMPA de 14 ppt, fondée sur les données existantes concernant la NDMA, représentait une mesure provisoire visant à réduire les rejets jusqu'à ce qu'une analyse plus approfondie soit effectuée.

Le Ministère a continué de surveiller les sources d'approvisionnement en eau du réseau de la rivière Grand qui dessert Waterloo, Kitchener, Brantford et les plus petites localités longeant la rivière qui se jette dans le lac Érié, près de Dunnville.

CONCENTRATION MAXIMALE ADMISSIBLE PROVISOIRE (CMAP)

La CMAP décrit les seuils d'une substance préoccupante dont on connaît les effets chroniques sur les humains et sur les animaux et pour laquelle aucune concentration maximale admissible n'a encore été établie. La présence d'une substance à une concentration supérieure à la CMAP indique qu'il est nécessaire d'effectuer d'autres échantillonnages et d'autres enquêtes, et de mettre en oeuvre de nouvelles mesures correctrices adaptées à chaque cas.

UN COMITÉ D'EXPERTS ÉTUDIE LE RISQUE QUE PRÉSENTE L'EXPOSITION " LA NDMA

En mai 1990, le Ministère a créé un comité d'experts chargé d'établir les seuils de NDMA admissibles et les risques qu'elle présente pour la santé. Toutes les voies d'exposition à la NDMA ont été évaluées, à

NEW NDMA DRINKING WATER GUIDELINE

A more stringent guideline (IMAC) for NDMA of 9 ppt in drinking water has now been adopted by the Ministry. This was based on the assessment of risks to health and relevant risk management factors such as analytical detection limits and relative risks from other sources of exposure.

The 9 ppt IMAC for NDMA represents an incremental lifetime cancer risk of 1 in 100,000. This is considered by regulatory agencies to be within the range of negligible risk. It is also a concentration which is analytically measurable.

The new IMAC for NDMA will be used to assess both drinking water and point source discharges and, where necessary, to control these discharges from sewage treatment plants and direct industrial dischargers.

savoir l'eau, le sol, l'alimentation et les biens de consommation.

On a aussi mesuré le risque progressif de cancer que présente l'exposition à la NDMA à différentes concentrations tout au long de la vie.

Le comité d'experts réunit des représentants des ministères de l'Environnement, de la Santé et du Travail, ainsi que de la municipalité régionale de Waterloo. Son rapport a aidé le Ministère à établir les concentrations maximales admissibles provisoires dans l'eau potable.

NOUVELLE LIMITE POUR LA NDMA DANS L'EAU POTABLE

Le Ministère a fixé une limite plus rigoureuse pour la NDMA dans l'eau potable. Cette nouvelle limite de 9 ppt est fondée sur l'évaluation du risque pour la santé et des facteurs pertinents de gestion des risques, tels les seuils de détection analytique et les risques relatifs inhérents à d'autres sources d'exposition.

La concentration maximale admissible provisoire, qui est fixée à 9 ppt pour la NDMA, représente un risque de cancer progressif de 1 sur 100 000. Selon les organismes de réglementation, cette concentration constitue un risque négligeable. Elle est par ailleurs mesurable en analyse.

La nouvelle concentration maximale admissible provisoire servira à évaluer la qualité de l'eau potable et des rejets de sources ponctuelles et, s'il y a lieu, elle permettra de contrôler les rejets des usines d'épuration des eaux d'égout et les rejets industriels directs.

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PIBS 08/91
08/91 6000

ENVIRONMENT
INFORMATION
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FALL 1991

Environment Environnement Ontario

ENVIRONMENT ONTARIO'S COMMITMENT TO THE GREAT LAKES

INTRODUCTION

The Great Lakes basin, the world's largest fresh-water reservoir, is home to one third of Canada's population. The benefits the Great Lakes bestow are immeasurable.

Drinking water from the Great Lakes sustains approximately 35 million Canadian and American residents. The plentiful supply of freshwater and accessible transportation routes makes the Great Lakes region the economic heartland of North America. Industries such as steel making, petrochemicals and automobile manufacturing provide jobs and consumer goods.

The natural beauty of the Great Lakes also provides its residents and visitors from around the globe with recreational opportunities ranging from swimming, boating, fishing and nature appreciation.

The Great Lakes ecosystem supports a variety of wildlife, birds, fish and vegetation.

However, pollution of the Great Lakes by industry, municipal sewer systems, runoff from urban and rural lands is threatening to squander this precious resource. Solutions are required that will allow the economic benefits to continue and at the same time protect the Great Lakes for the use and enjoyment of future generations.

THE PROBLEM

Toxic chemicals, phosphorus and bacteria are the Great Lakes' worst enemies. These pollutants can enter the basin from wastewater discharged from factories and sewage treatment systems; through water that runs off urban or rural land; and as a result of contaminated groundwater re-entering rivers or lakes. Airborne pollution is also a major source of toxic substances to the Great Lakes.

Toxic Chemicals

Restrictions imposed during the 1970s and 1980s have resulted in lower levels of pesticides, PCBs and mercury going into the Great Lakes basin. However, despite these reductions toxic chemicals are still present at levels that may affect the Great Lakes ecosystem.

Many recent scientific studies link the presence of toxic chemicals to the development of tumours, deformities, reproductive difficulties and death in some species of fish and birds.

Two years ago, the International Joint Commission (IJC) had strong evidence that toxic chemicals in the Great Lakes, which had already shown strong impact on the natural environment, might be hazard-ous to the human population around the lakes. The Commission's scientific advisors now concur that those chemicals are affecting human health.

Phosphorus

The flow of phosphorus into the Great Lakes from sewage, phosphate-based detergents and fertilizers encourages the rapid growth of algae, making the water unpleasant for swimmers and killing other beneficial plants that are an important source of oxygen for fish. When the aquatic plants decay, they rob the waters of oxygen vital for the survival of fish and other aquatic life.

Restrictions in phosphorus discharges as a result of the **Great Lakes Water Quality Agreement** have reduced the amount entering the Great Lakes. However, some additional reductions are still required, and continued protection will be necessary, to ensure that the lakes remain healthy despite the pressure of growing populations.

Bacteria

In urban areas, fecal coliform bacteria from sewage treatment plant by-passes, combined sewer overflows, stormwater runoff and animal feces have resulted in frequent beach closures.

In rural areas, faulty septic systems, farm animals watering in streams and runoff from improperly stored manure fertilizer also contribute bacteria to rivers and streams that empty into the Great Lakes. This has resulted in the closure of some rural beaches.

SOLUTIONS

What Environment Ontario is Doing

The environment is now being taken into account in all Ontario government policies and programs. Ontario is committed to preventing further pollution from occurring and to cleaning up existing pollution problems.

Everyone has a stake in the environment, including both a right to enjoy its benefits and a responsibility for its protection. Only through a co-operative approach, involving industry, government and the public, can we ensure that all elements of the ecosystem exist in harmony.

The Ministry of the Environment is moving to ensure that its programs stress pollution prevention and involve the public, emphasizing a sustainable environment and encouraging the transformation from a consumer to a conserver society.

Here is a list of some of the things Environment Ontario is doing to help restore the Great Lakes basin and prevent future pollution:

The Great Lakes Water Quality Agreement (GLWQA)

Originally signed in 1972 and again in 1978 between Canada and the United States, the GLWQA commits both countries to reduce the amount of phosphorus and toxic chemicals entering the Great Lakes. A protocol signed in 1987, amending the 1978 agreement, reaffirmed the commitment of the governments of Canada and the United States to work with citizens and industry to restore and protect the chemical, physical and biological quality of the Great Lakes.

Canada-Ontario Agreement Respecting Great Lakes Water Quality (COA)

This is the formal mechanism by which the Ontario government commits itself to undertake those requirements of the GLWQA that fall within its jurisdiction.

Remedial Action Plans (RAPS)

To fulfil these agreements, RAPS are being developed for 43 polluted Areas of Concern in the Great Lakes Basin. Seventeen of these areas are in Ontario.

Each RAP area will produce a cleanup/management plan leading to the restoration and protection of desirable water uses in the area of concern. Public advisory committees of concerned citizens and other stakeholders provide the public's point of view and formally participate in the development and approval of the various stages of the plan.

MUNICIPAL/INDUSTRIAL STRATEGY FOR ABATEMENT (MISA)

This is a major Ontario initiative aimed at preventing, reducing and, in some cases, eliminating water pollution problems that originate with industries and municipalities. Its ultimate goal is to eliminate the discharge of persistent toxic contaminants to all Ontario waterways.

Regulations are being applied first to the industries that have been most clearly identified as major sources of pollution. Individual dischargers may be required to meet even tighter requirements if water quality problems persist or improved technology becomes available.

Options for regulating municipal sewage treatment plants and industries using the municipal sewer system are being reviewed. As part of the program, studies have been completed on the performance of 37 sewage treatment plants in Ontario. **Sewer Use Control Demonstration Projects** have been completed in five (5) communities across Ontario.

LAKE MANAGEMENT

The **Lake Ontario Toxic Management Plan** co-ordinates an array of Canadian and U.S. Programs. A binational program is also being developed to restore and protect Lake Superior.

DRINKING WATER

Guidelines are set to ensure the quality of drinking water in Ontario. The **Drinking Water Surveillance Program** surveys about 70 water treatment plants serving about 80 per cent of Ontario's population to ensure that the objectives are being met. A large percentage of Ontario's population gets its drinking water from the Great Lakes. The Ministry is also examining options for the development of a **Safe Drinking Water Act**.

FISH MONITORING

Data is collected through the **Sport Fish Contaminant Monitoring Program** to produce consumption advice, published annually in the **Guide to Eating Ontario Sport Fish**. The data also provides an indication of the trends in water quality in the Great Lakes. This program is a joint Ministry of Natural Resources, Ministry of the Environment program.

BEACHES

The **Beaches Improvement Program** includes initiatives to monitor and improve urban beaches. The **Clean Up Rural Beaches Program** provides grants to rural residents in participating watersheds to take measures to prevent pollution and eliminate beach closures.

OTHER GREAT LAKES PROGRAMS

Programs also exist to measure and assess the effects of phosphorus and toxic chemicals in the Great Lakes (**Phosphorus Reduction Management Program** and the **Great Lakes Surveillance Program**); the effects of contaminants in sediment and aquatic life (**Ontario Sediments Program**.)

OTHER MINISTRY PROGRAMS

Environment Ontario has taken strong action to reduce sulphur dioxide emissions and is preparing further proposals to address water pollution caused by toxic rain. The Ministry also regulates the use of pesticides to reduce their burden on the environment.

LEGISLATION

The **Ontario Environmental Protection Act (EPA)** and the **Ontario Water Resources Act (OWRA)** make it an offense to discharge harmful material into water. The acts also enable the ministry to issue control orders directing a company to make changes to their operations to prevent future pollution. The Ministry also develops **Ontario Water Quality Objectives** which, if exceeded, may lead to the issuing of a control order or serve as the basis for charges under the EPA or the OWRA. Pesticide usage is regulated under the **Pesticides Act**. Planning for large developments is considered under the **Environmental Assessment Act**.

How You Can Help

Examine your personal habits to ensure you are not contributing to the problem. Here are a few examples:

- Ensure that paints and other hazardous chemicals are not poured down your sinks, toilets or into sewers but disposed of at municipal hazardous waste depots.
- Purchase unbleached paper and recycled paper products.
- Stoop and scoop after your pet to reduce the pollution that comes from stormwater runoff.
- Get involved in the Great Lakes clean up effort by participating in a Remedial Action Plan.
- Practice water conservation.

FOR MORE INFORMATION, PLEASE CONTACT

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pour prévenir la pollution. Le Ministère établit les **objectifs relatifs à la qualité de l'eau de l'Ontario** et si ces objectifs ne sont pas respectés, il peut délivrer un arrêté d'intervention ou engager des poursuites en vertu de la **Loi sur la protection de l'environnement** ou de la **Loi sur les ressources en eau de l'Ontario**. L'emploi des pesticides est régi en vertu de la **Loi sur les pesticides** de L'Ontario. La planification des projets d'aménagement d'envergure tombe sous le coup de la **Loi sur les évaluations environnementales**.

CE QUE VOUS POUVEZ FAIRE

Examinez vos habitudes personnelles pour vous assurer que vous ne contribuez pas, par inadvertance, à la pollution. Voici quelques exemples:

- Prenez soin de ne pas jeter de peinture ou d'autres produits chimiques dangereux dans l'évier, les toilettes ou les égouts. Déposez-les plutôt dans un centre de collecte des déchets dangereux de votre municipalité.
- Achetez du papier non blanchi et des produits faits à partir de papier recyclé.
- Suivez votre chien pelle en main pour réduire la pollution émanant des eaux de ruissellement.
- Participez au programme de nettoyage des Grands Lacs de votre localité en contribuant au plan d'assainissement local.
- Économisez l'eau.

POUR PLUS DE RENSEIGNEMENTS, S'ADRESSER AU:

Ministère de l'Environnement de l'Ontario
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PRINTED ON RECYCLED PAPER
IMPRIMÉ SUR DU PAPIER RECYCLÉ

PIBS 1721B
10/91 5000

La Stratégie municipale et industrielle de dépollution (SMID)

Il s'agit d'une importante initiative prise par l'Ontario dans le but de prévenir, de réduire et, dans certains cas, d'éliminer la pollution de l'eau causée par les industries et les municipalités. Son objectif ultime consiste à éliminer le déversement de contaminants toxiques persistants dans les cours d'eau de la province.

La réglementation s'applique d'abord aux industries qui se sont clairement révélées être les principales sources de pollution. Les pollueurs pourront être tenus de se soumettre à des exigences encore plus strictes si les problèmes de qualité de l'eau persistent ou si de meilleures technologies de dépollution sont mises au point.

Le gouvernement revoit actuellement les possibilités de réglementer les stations municipales d'épuration des eaux usées et les industries qui déversent leurs effluents dans les égouts municipaux. Les études entreprises sur le rendement des 37 stations d'épuration de l'Ontario dans le cadre de la SMID sont maintenant terminées. Des **projets pilotes de contrôle de l'utilisation des égouts** ont été mis en oeuvre dans cinq (5) localités de la province.

La gestion des lacs

Le **plan de gestion des substances toxiques dans le lac Ontario** coordonne tout un éventail de programmes canadiens et américains. Un programme binational est également en voie de préparation dans le but de restaurer et de protéger la qualité de l'eau du lac Supérieur.

L'eau potable

Le gouvernement de la province est en train d'établir des lignes directrices visant la préservation de la qualité de l'eau potable en Ontario. Le **Programme de surveillance de l'eau potable** effectue des contrôles dans quelque 90 stations de traitement de l'eau desservant environ 80 pour cent de la population ontarienne pour s'assurer que les limites sont bien respectées. Un grand pourcentage de la population de la province tire son eau potable des Grands Lacs. Le Ministère étudie également quelques projets de législation sur la salubrité de l'eau potable.

La surveillance du poisson

Grâce au **Programme de surveillance de la contamination du poisson gibier**, le Ministère obtient des données qui permettent de publier chaque année le **Guide pour la consommation du poisson gibier de l'Ontario**. Ces données indiquent également les tendances en matière de qualité de l'eau dans les Grands Lacs. Il s'agit d'un programme conjoint du ministère des Richesses naturelles et du ministère de l'Environnement.

Les plages

Le **Programme d'amélioration de la qualité des plages** comprend des initiatives visant à surveiller et à améliorer les plages urbaines. Le **Programme de dépollution des plages rurales** accorde des subventions aux résidents des régions rurales dont les eaux se déversent dans les Grands Lacs pour qu'ils prennent des mesures contre la pollution qui permettent d'éviter la fermeture des plages.

Autres programmes relatifs aux Grands Lacs

Il existe également des programmes de mesure et d'évaluation des effets du phosphore et des produits chimiques toxiques dans les Grands Lacs (**programme de réduction du phosphore** et **Programme de surveillance des Grands Lacs**), ainsi que des contaminants qui se trouvent dans les sédiments et les organismes vivant au fond de l'eau (**programme des sédiments de l'Ontario**).

Autres programmes du Ministère

Le ministère de l'Environnement de l'Ontario a adopté des mesures rigoureuses visant à réduire les émissions de dioxyde de soufre. Il envisage également d'autres mesures de lutte contre la pollution par les pluies acides. Il réglemente par ailleurs l'utilisation de pesticides dans le but d'en diminuer les effets sur l'environnement.

Les lois et règlements

La **Loi sur la protection de l'environnement de l'Ontario** et la **Loi sur les ressources en eau de l'Ontario** interdisent le déversement de substances toxiques dans l'eau. Ces lois permettent également au Ministère de délivrer des arrêtés d'intervention obligeant les entreprises à modifier leurs méthodes d'exploitation

Le phosphore

L'afflux de phosphore dans les Grands Lacs provenant des égouts et de l'utilisation de détergents et d'engrais à base de phosphates favorise la prolifération des algues, ce qui rend les eaux désagréables pour les baigneurs et tue d'autres plantes utiles qui constituent une source importante d'oxygène pour les poissons. La décomposition des plantes aquatiques prive l'eau de l'oxygène nécessaire à la survie des poissons et des autres organismes aquatiques. Les restrictions prévues dans **l'Accord relatif à la qualité de l'eau dans les Grands Lacs** ont contribué à réduire la quantité de phosphore qui pénètre dans ces eaux. Il faudra cependant aller plus loin dans ce sens et continuer à protéger la qualité de l'eau de manière à assurer la salubrité des lacs malgré les pressions démographiques.

L'activité bactérienne

Dans les régions urbaines, les coliformes fécaux provenant des dérivations des stations d'épuration des eaux usées ou du trop-plein des égouts unitaires, de l'écoulement des eaux pluviales et des matières fécales animales ont forcé les autorités à fermer souvent les plages.

Dans les régions rurales, les fosses septiques défectueuses, les animaux de ferme qui vont boire dans les cours d'eau et les eaux de ruissellement contaminées par du fumier mal entreposé apportent également des bactéries dans les rivières et les cours d'eau qui se déversent dans les Grands Lacs. Cette situation a également entraîné la fermeture de certaines plages rurales.

SOLUTIONS

Ce que fait le Ministère

Les politiques et les programmes du gouvernement de l'Ontario tiennent désormais compte de l'environnement. La province est déterminée à mettre un frein à la pollution et à remédier aux problèmes existants.

Nous avons tous intérêt à ce que l'environnement soit protégé et sommes tous responsables de sa protection. Ce n'est que si l'industrie, le gouvernement et le public joignent leurs efforts que nous pourrons faire en sorte que tous les éléments de l'écosystème vivent en harmonie.

Tous les programmes du ministère de l'Environnement sont axés sur la prévention de la pollution et la participation du public. Ils mettent l'accent sur la préservation de l'environnement à long terme et nous encouragent à nous transformer de société de consommation en société de conservation.

Voici quelques-unes des initiatives prises par Environnement Ontario pour contribuer à la restauration du bassin des Grands Lacs et prévenir la pollution future :

L'Accord relatif à la qualité de l'eau dans les Grands Lacs

Cet accord canado-américain, qui a été signé pour la première fois en 1972 et de nouveau en 1978, engage les deux pays à réduire la quantité de phosphore et de produits chimiques toxiques qui entrent dans les Grands Lacs. Un protocole signé en 1987 qui modifiait l'accord de 1978 réaffirmait l'engagement du Canada et des États-Unis à travailler en collaboration avec le public et l'industrie pour rétablir et protéger la qualité chimique, physique et biologique des Grands Lacs.

L'Accord Canada-Ontario relatif à la qualité de l'eau dans les Grands Lacs

Il s'agit d'un mécanisme officiel par lequel le gouvernement ontarien s'engage à satisfaire aux exigences de l'Accord relatif à la qualité de l'eau dans les Grands Lacs, qui relèvent de sa compétence.

Les plans d'assainissement

On prépare actuellement des plans d'assainissement pour 43 secteurs de préoccupation du bassin des Grands Lacs, dont 17 sont situés en Ontario.

Chaque plan d'assainissement comprendra un plan de gestion du nettoyage visant à restaurer et à protéger les utilisations bénéfiques du secteur. Des comités consultatifs publics constitués de citoyens et d'autres intervenants présenteront le point de vue du public. Ils participeront par ailleurs à l'élaboration et à l'approbation des diverses étapes du plan.

ENVIRONMENT INFORMATION-ENVIRONNEMENT

Ontario Environment Environnement

AUTOMNE 1991

L'ENGAGEMENT DU MINISTÈRE DE L'ENVIRONNEMENT DE L'ONTARIO VIS-À-VIS DES GRANDS LACS

INTRODUCTION

Un tiers de la population canadienne occupe la région du bassin des Grands Lacs, qui constitue le plus grand réservoir d'eau douce au monde. Son utilité est incommensurable.

Environ 35 millions de Canadiens et d'Américains puisent leur eau dans les Grands Lacs. D'abondantes réserves d'eau douce et des voies de transport accessibles font de cette région le coeur de l'économie nord-américaine. Les industries comme la sidérurgie, la pétrochimie et l'industrie automobile procurent des emplois et des biens de consommation.

La beauté naturelle des Grands Lacs confère également aux résidents de la région et aux visiteurs du monde entier des possibilités récréatives allant de la baignade, du nautisme et de la pêche au simple plaisir d'admirer la nature.

L'écosystème des Grands Lacs assure la survie de diverses espèces fauniques, d'oiseaux, de poissons et de végétation.

Cependant, la pollution provenant des industries, des égouts municipaux, et des eaux de ruissellement urbaines et rurales risque de détruire cette précieuse ressource. Il faut remédier à la pollution tout en assurant le maintien des avantages économiques, et en préservant les Grands Lacs pour les générations futures. La pollution atmosphérique constitue une autre source importante de substances toxiques dans les Grand Lacs.

LE PROBLÈME

Les substances chimiques toxiques, le phosphore et les bactéries sont les pires ennemis des Grands Lacs. Ces agents polluants peuvent entrer dans le bassin, véhiculés par les eaux usées provenant des usines et des réseaux d'épuration, les eaux de ruissellement urbaines et rurales et la nappe d'eau souterraine contaminée qui retourne aux rivières et aux lacs.

La présence de substances chimiques toxiques

À la suite des restrictions imposées dans les années 70 et 80, la quantité de pesticides, de BPC et de mercure qui arrive dans le bassin des Grands Lacs a diminué. Cependant, en dépit de cette réduction, les substances chimiques toxiques sont toujours présentes à des taux qui pourraient être nuisibles pour l'écosystème.

De nombreuses études scientifiques effectuées récemment lient la présence de substances toxiques à l'apparition de tumeurs, de difformités, de difficultés de reproduction et à la mort de certaines espèces de poissons et d'oiseaux.

Il y a deux ans, la Commission mixte internationale a eu la preuve que les produits chimiques toxiques qui se trouvent dans les Grands Lacs et dont les effets dévastateurs sur l'environnement ont déjà été démontrés, risquent d'être dangereux pour la population humaine de la région. Les conseillers scientifiques de la Commission confirment aujourd'hui que ces produits chimiques sont nuisibles à la santé.

ENVIRONMENT
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Ontario Environment
Environnement

WINTER 1991 HIVER 1991

BACKGROUNDER: SCRAP TIRE MANAGEMENT

INTRODUCTION

The Ministry of the Environment is developing a comprehensive scrap tire management strategy based on the three R's -- reduce, reuse and recycle.

Each year, seven to eight million scrap tires are produced in Ontario. Currently, 60 per cent of these are disposed at landfill sites; 25 per cent are reused or recycled; 10 percent go to outdoor storage sites and the remaining 5 percent are exported or have other uses.

Disposal of tires into landfill sites consumes increasingly scarce disposal resources. Environment Ontario has established targets to divert 25 per cent of Ontario's solid waste from disposal to alternative uses by 1992 and 50 per cent by 2000. Consequently, the ministry's long-term policy challenge is the diversion of scrap tires from disposal to productive 3R activities including the development of markets for products containing recycled rubber from tires.

In the short-term, the challenge is to find environmentally-acceptable destinations for the storage of scrap tires awaiting recycling.

The development of a comprehensive scrap tire management strategy is an ongoing process which requires input from many parties. To date, the Ontario government has initiated a number of activities with a view to realizing its short and long term goals.

FEUILLET D'INFORMATION SUR LA GESTION DES VIEUX PNEUS

INTRODUCTION

Le ministère de l'Environnement prépare actuellement une stratégie globale en matière de gestion des vieux pneus. Cette stratégie est fondée sur l'application des 3 « R », c'est-à-dire réduire, réutiliser et recycler.

L'Ontario produit chaque année entre sept et huit millions de vieux pneus. Actuellement, 60 % de ces pneus aboutissent dans des lieux d'enfouissement, 25 % sont réutilisés ou recyclés, 10 % sont laissés dans des lieux d'entreposage et les 5 % qui restent sont exportés ou utilisés à d'autres fins.

L'utilisation des lieux d'enfouissement pour l'entreposage de vieux pneus ne fait qu'ajouter au problème du manque d'espace. Environnement Ontario a décidé de se fixer des objectifs au chapitre du réacheminement des déchets. Ainsi, le ministère veut réacheminer 25 % des déchets solides d'ici 1992 et 50 % d'ici l'an 2000. Il faudra trouver pour ces déchets des usages plus productifs. Le défi que doit relever le Ministère, au chapitre du réacheminement des vieux pneus, consiste à établir une stratégie d'application des 3 « R » à long terme, qui inclurait la création de débouchés pour les produits qui contiennent du caoutchouc provenant de vieux pneus.

SCRAP TIRE MANAGEMENT ACTIVITIES

Long term - recycling

In October 1989, the Ministry of the Environment established a task force on tire recycling comprised of representatives from the tire industry, municipalities, the environmental community and the ministry. The task force provides the ministry with expertise on scrap tire management and provides a forum for information exchange amongst these groups.

A study report, Scrap Tire Management in Ontario, was released in January 1991. It addresses tire recycling technologies and markets, examines scrap tire management programs in other jurisdictions, updates data related to scrap tires and sets out the policy challenges facing the ministry.

The ministry is also providing assistance for scrap tire recycling projects. For example, $5 million has been committed to two rubber asphalt demonstration projects, one in the Regional Municipality of Haldimand-Norfolk, the other near Thamesville. These projects will be reviewed in detail as rubber asphalt has the potential to use a significant quantity of the scrap tires generated in the province. Some 5000 tires can be used in one kilometre of paved road.

A further $25,000 has been committed to Sportbau Canada, a Mississauga company, for the utilization of crumb rubber in rubberized sports surfaces.

An agreement has been signed with Recovery Technology in Ayr for a $1.5 million grant to purchase equipment for crumbing rubber and to develop crumb rubber products. Other agreements are under negotiation and about 30 other proposals have been received for review.

Short term - environmentally-acceptable storage sites

As a result of the February 1990 Tyre King tire fire, the Ontario government made it a priority to improve control at existing tire storage sites. Since then a number of initiatives have been taken.

All sites were inspected by fire department and Ministry of Environment staff and security provided where necessary.

Used tires were designated as waste under the *Environmental Protection Act* (EPA) and all sites containing more than 5000 tires were required to obtain Certificates of Approval to operate.

A court terme, il faudra trouver, pour l'entreposage des pneus destinés au recyclage, des lieux qui soient acceptables du point de vue de l'environnement.

L'élaboration d'une stratégie globale de gestion des vieux pneus représente un projet de longue haleine qui exige la participation de plusieurs parties. A ce jour, le gouvernement ontarien a instauré bon nombre d'activités en vue d'atteindre ses objectifs tant à court terme qu'à long terme.

ACTIVITÉS DE GESTION DES VIEUX PNEUS

Solution à long terme - le recyclage

En octobre 1989, le ministère de l'Environnement a créé un groupe de travail sur le recyclage des vieux pneus réunissant des représentants de l'industrie de la fabrication des pneus, des municipalités, des groupes environnementaux et du Ministère. Ce groupe de travail met son expertise au service du Ministère et favorise l'échange d'informations.

Un rapport d'étude, intitulé Scrap Tire Management in Ontario, a été rendu public en janvier 1991. Il fait état des technologies de récupération des vieux pneus et des débouchés actuels, examine les programmes de gestion qui existent dans d'autres compétences, met à jour les données concernant les vieux pneus et fait le point sur les défis qui attendent le Ministère.

Le Ministère fournit aussi une aide financière pour la réalisation de projets de recyclage des vieux pneus. La somme de 5 millions de dollars a été accordée à deux projets de démonstration sur l'asphalte caoutchouté, l'un dans la municipalité régionale de Haldimand-Norfolk, l'autre à proximité de Thamesville. Ces deux projets seront étudiés en détail, car l'utilisation d'asphalte caoutchouté pourrait constituer un excellent moyen de recycler une portion importante des vieux pneus produits en Ontario. Avec quelque 5 000 pneus recyclés, on peut asphalter un kilomètre de route.

Par ailleurs, 25 000 $ ont été alloués à Sportbau Canada, une entreprise de Mississauga, qui utilise des miettes de caoutchouc dans la fabrication de surfaces pour la pratique de sports.

Le Ministère a aussi signé une entente avec Recovery Technology à Ayr. Le Ministère a accordé une subvention de 1,5 million de dollars à la société pour l'achat d'équipement de déchiquetage du caoutchouc et pour la mise au point de produits

obtain Certificates of Approval to operate.

Changes were made to the Fire Code to effect better control at sites. Tires must be separated into piles of 300 cubic metres or less and access lanes and water supplies must be provided.

Changes made to the EPA enable the Ministry of the Environment to issue a control order if a site owner does not comply with ministry directions. If the owner fails to implement conditions of the control order or launches an appeal, the ministry has the power to start work to bring the site into compliance to ensure environmental protection. If at a later date, the appeal board refuses the appeal, then the government may commence action against the owner to recover costs for any work completed to date.

NEXT STEPS

These initiatives represent a firm foundation upon which, the ministry will continue to develop a comprehensive scrap tire management program.

In March 1991, the ministry is hosting a two-day workshop for representatives of tire dealers and manufacturers, municipalities environmental groups and the public. An discussion paper will be presented at the workshop so that the ministry can receive input from key stakeholders on the implementation of long and short term strategies for scrap tire management.

To meet the short term challenge of environmentally-acceptable destinations for scrap tires, the ministry is developing a program to provide assistance for scrap tire receiving facilities. At these facilities, tires would be received and sorted to direct as many tires as possible to existing recyclers. Remaining tires would be safely stored while awaiting expanded recycling markets.

As well, the ministry will continue to review proposals for projects to develop technologies, products and markets for tire recycling.

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fabriqués à partir de miettes de caoutchouc. D'autres ententes font présentement l'objet de négociations et environ 30 autres offres sont à l'étude.

Solution à court terme - des lieux d'enfouissement acceptables du point de vue de l'environnement

Après l'incendie survenu en février 1990, le gouvernement de l'Ontario a décidé de mettre l'accent sur le resserrement des normes de sécurité aux lieux d'entreposage existants. Depuis, bon nombre de mesures ont été prises.

Tous les lieux d'entreposage ont été inspectés par un service d'incendie et le personnel du ministère de l'Environnement. Des services de sécurité ont été mis sur pied là où cela s'avérait nécessaire.

Les vieux pneus sont maintenant inscrits dans la classe des déchets au sens de la Loi sur la protection de l'environnement. Pour tout lieu où sont entreposés plus de 5 000 pneus, un certificat d'autorisation doit avoir été délivré.

Des modifications ont été apportées au Code de prévention des incendies pour améliorer la surveillance des lieux. Les pneus doivent dorénavant être répartis en amas de 300 mètres cubes ou moins. Les lieux d'entreposage doivent être pourvus de voies d'accès et de réserves d'eau.

Par ailleurs, les modifications apportées à la Loi sur la protection de l'environnement permettent au Ministère de délivrer un arrêté d'intervention au cas où un propriétaire de lieu d'entreposage ne respecterait pas les directives établies par le Ministère. Si le propriétaire ne respecte pas les conditions de l'arrêté d'intervention ou s'il interjette appel, le Ministère a le droit d'entreprendre les travaux nécessaires pour rendre les lieux conformes aux normes de sécurité prévues. Si, plus tard, la commission d'appel rejette l'appel, le gouvernement peut intenter une poursuite contre le propriétaire pour recouvrer les sommes qu'il a engagées.

ÉTAPES SUBSÉQUENTES

Ces initiatives représentent la pierre angulaire de la stratégie de gestion des vieux pneus que le ministère de l'Environnement compte instaurer pour l'avenir.

En mars 1991, le Ministère tiendra un atelier de deux jours à l'intention des représentants des fabricants et des distributeurs de pneus, des municipalités, des groupes environnementaux et du public. Un document de travail sera alors présenté. Le

Ministère compte aussi obtenir les commentaires des principaux intéressés sur la mise en place de stratégies à court terme et à long terme en matière de gestion des vieux pneus.

En vue de répondre à la demande à court terme de lieux d'entreposage qui soient acceptables du point de vue de l'environnement, le Ministère prépare actuellement un programme d'aide à l'intention des installations qui reçoivent les vieux pneus. Ces installations se chargeraient de la réception et du tri des vieux pneus, puis le plus grand nombre possible de pneus seraient expédiés aux entreprises de recyclage. Le reste serait entreposé en toute sécurité en attendant que le marché du recyclage soit élargi.

Le Ministère continuera d'étudier tous les projets de mise au point de technologies de recyclage des vieux pneus, de conception de produits à partir du caoutchouc recyclé et de création de débouchés pour ces produits.

Pour obtenir de plus amples renseignements communiquer avec:

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PRINTED ON RECYCLED PAPER
IMPRIMÉ SUR DU PAPIER RECYCLÉ

PIBS 1446b
08/91 3M

ENVIRONMENT INFORMATION - ENVIRONNEMENT

SPRING 1992 | Ontario Environment Environnement | PRINTEMPS 1992

BACKGROUNDER: ENVIRONMENTAL ASSESSMENT PROGRAM REFORM

WHAT IS THE PURPOSE OF THE *ENVIRONMENTAL ASSESSMENT ACT*?

The *Environmental Assessment Act* provides "for the protection, conservation and wise management... of the environment". "Environment" is broadly defined to include social, economic and cultural conditions as well as the natural and built environment.

HOW IS THE ACT APPLIED?

The act sets out an Environmental Assessment (EA) process for the planning and execution of activities or undertakings in an environmentally acceptable manner. A person or institution (the "proponent") wishing to proceed with an undertaking must:

- consider alternatives to proceeding and alternative ways of proceeding;
- evaluate the environmental effects of each alternative;
- demonstrate a sound decision making process that minimizes environmental effects;
- compile a formal document for government and public scrutiny;
- and, if required, present it to the Environmental Assessment Board at a public hearing.

The undertaking can be approved, approved subject to certain conditions.

RENSEIGNEMENTS GÉNÉRAUX SUR LA RÉFORME DU PROGRAMME D'ÉVALUATION ENVIRONNEMENTALE

QUEL EST L'OBJET DE LA *LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES*?

La *Loi sur les évaluations environnementales* a pour objet « d'assurer la protection, la conservation et la gestion avisée de l'environnement en Ontario ». Dans sa définition la plus large, le terme « environnement » embrasse les conditions sociales, économiques et culturelles qui se répercutent sur l'être humain, ainsi que le monde physique, animal et végétal dont il dépend.

COMMENT LA LOI EST-ELLE MISE EN APPLICATION?

La Loi régit la planification et la mise en oeuvre des projets (« entreprises ») du secteur public pour qu'ils soient réalisés d'une façon conciliable avec l'environnement. Elle prévoit à cette fin un processus d'évaluation environnementale, en vertu duquel toute personne ou tout organisme public (le « promoteur ») désirant exploiter une « entreprise » doit :

- étudier les solutions de rechange et les diverses façons de mener à bien son entreprise;
- évaluer les répercussions environnementales de chacune des solutions de rechange envisagées;
- planifier des mesures propres à atténuer les répercussions environnementales de son entreprise;
- rédiger un rapport qui fera l'objet d'un examen minutieux de la part du gouvernement et du public; et, si le promoteur est tenu de le faire,
- présenter ce rapport à la Commission des évaluations environnementales dans le cadre d'une audience publique.

WHAT TYPE OF UNDERTAKINGS ARE COVERED UNDER THE ACT?

The Act applies to provincial and municipal undertakings such as Ontario Hydro major transmission lines, highways, rapid transit and landfill sites.

Private sector projects are not covered by the Act itself, but they can be designated individually by regulation pursuant to the Act.

WHAT IS A CLASS EA?

Some undertakings are similar in nature, occur frequently, are limited in scale and have only minor and predictable environmental impacts. These undertakings are approved through a "Class EA" process rather than through an individual EA. Examples include improvements to existing water works, sewage works and roadways.

The Class EA process is a self-assessment process by the proponent provided that the proponent adheres to the prescribed planning process. If a particular undertaking within a class warrants individual attention it may be "bumped up" to an individual undertaking.

The concept of a Class EA is not specifically provided for in the Act. Class EAs were developed in response to a need in accordance with the principles of the Act.

ARE THERE EXEMPTIONS FROM THE ACT?

Since the mid 1980s exemptions have been substantially reduced. This means that more proponents must learn to follow the principles of the Act. However, exemptions may be given for emergency situations such as hazardous site clean-ups or interim expansion of landfills. For example, an exemption from the Act was granted to allow clean-up at the 1990 tire fire near Hagersville.

WHAT ARE THE BENEFITS OF THE *EA ACT* ?

The *EA Act* is an effective mechanism for decision-making where environmental issues are complex and interests diverse. The EA process has delivered approvals and created good public acceptance for controversial projects such as landfill sites. It also

L'entreprise proposée peut être autorisée, ou autorisée à certaines conditions.

QUELLES SORTES D'ENTREPRISES LA LOI RÉGIT-ELLE?

Sont assujetties à la Loi les entreprises provinciales ou municipales, comme les lignes de distribution électrique d'Ontario Hydro, les autoroutes, les réseaux de transport terrestre à grande vitesse et les lieux d'enfouissement.

Les entreprises du secteur privé ne sont pas régies par la Loi elle-même, mais peuvent être désignées séparément en vertu d'un règlement découlant de la Loi.

EN QUOI CONSISTE UNE ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE?

Certaines entreprises de petite échelle et de nature semblable sont réalisées fréquemment; leurs retombées environnementales sont minimes et prévisibles. Au lieu de faire l'objet d'une évaluation particulière, ces entreprises sont soumises à une évaluation environnementale dite « de portée générale ». Citons comme exemples les améliorations apportées aux ouvrages d'eau et d'égouts existants et les travaux de réfection des routes.

Le processus d'évaluation environnementale de portée générale en est un d'auto-évaluation. Le promoteur peut évaluer et approuver son propre projet, à condition d'adhérer au processus de planification prescrit par la Loi. Si une entreprise mérite une attention particulière, il se peut qu'elle change de catégorie et fasse l'objet d'une évaluation particulière.

Soulignons que cette notion de « portée générale » ne fait l'objet d'aucune disposition particulière dans la Loi, mais qu'elle découle plutôt de l'esprit de celle-ci.

CERTAINES ENTREPRISES SONT-ELLES EXEMPTÉES?

De nombreuses exemptions ont été éliminées depuis le milieu des années quatre-vingt. De plus en plus de promoteurs doivent donc se plier aux fondements de la Loi. Cela dit, certaines situations d'urgence, comme la remise en état d'un lieu contaminé ou l'expansion provisoire d'un lieu d'enfouissement, peuvent justifier une exemption. À titre d'exemple, une exemption a été accordée en 1990 pour permettre le nettoyage immédiat des sols pollués

ensures that projects are better planned for Ontario's environment than they would be without the process. Many proponents acknowledge that the *EA Act* has encouraged them to adopt comprehensive, environmentally-sensitive approaches to pursuing opportunities and resolving problems.

WHY IS THERE A NEED FOR EA REFORM?

Since the *EA Act* was proclaimed in 1976, the principles of the Act have remained sound. However problems with the administration of the Act have been identified. These problems fall into three main areas:

- **Need for clarity:** There is a need for clearer direction to proponents and the public with respect to what is expected of them in the EA process, particularly at the start and in the early stages of the process.

- **More efficient EA program administration:** Too much time has been taken for some government reviews of EA documents and for decisions respecting bump-up and designation requests from the public.

- **More efficient and effective EA Board hearings:** While only one percent of individual EAs have required a Board hearing, a few of these hearings have become protracted and costly.

HOW HAS THE EA PROCESS BEEN REVIEWED?

In 1988, the review of the Environmental Assessment program commenced. It involved an Inter-Ministry Liaison Committee and a Public Advisory Group comprised of environmental and other special interest groups. A report produced by a Ministry of the Environment Task Force - *Toward Improving the Environmental Assessment Program in Ontario* - was released by the Honourable Ruth Grier in December 1990.

Extensive public consultation was undertaken, at the minister's request, by the Environmental Assessment Advisory Committee (EAAC). The Committee received 170 submissions and met with many concerned individuals and organizations in the first half of 1991.

après l'incendie qui a ravagé une cour d'entreposage de pneus, près de Hagersville.

QUELS SONT LES AVANTAGES DE LA *LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES*?

La *Loi sur les évaluations environnementales* facilite et accélère les prises de décisions lorsque les enjeux environnementaux sont complexes et les intérêts divers. Le processus d'autorisation qui découle de la Loi a fait ses preuves auprès du public, surtout en ce qui concerne les projets controversés comme les lieux d'enfouissement. Grâce à la Loi, les projets ontariens sont planifiés judicieusement, en tenant compte de l'environnement. De nombreux promoteurs reconnaissent d'ailleurs que la *Loi sur les évaluations environnementales* les a encouragés à adopter des stratégies créatives, qui respectent l'environnement.

POURQUOI LA RÉFORME?

Depuis sa promulgation, en 1976, la *Loi sur les évaluations environnementales* n'a pas été remise en question dans ses fondements. Son application a toutefois occasionné certaines difficultés, regroupées en trois catégories :

- **Clarté :** La Loi ne précise pas assez clairement le processus d'évaluation auquel doivent adhérer les promoteurs et le public, notamment au début et aux premières étapes de l'évaluation.

- **Efficacité :** Il faut accélérer l'examen des évaluations et hâter les décisions concernant le changement de catégorie et les demandes de désignation présentées par le public.

- **Audiences de la Commission des évaluations environnementales :** Bien qu'un pour cent seulement des évaluations aient été portées devant la Commission des évaluations environnementales, quelques-unes des audiences ont duré très longtemps et se sont révélées par conséquent assez coûteuses.

COMMENT LE PROGRAMME D'ÉVALUATION ENVIRONNEMENTALE A-T-IL ÉTÉ REVU?

La révision du programme d'évaluation environnementale a commencé en 1988. Deux groupes consultatifs y ont participé : le Comité de liaison interministériel et le Groupe consultatif public, qui réunit des groupes d'intérêts particuliers, groupes

Preliminary review of the public comments submitted to EAAC indicated that the majority of the submissions were generally supportive of the principles of environmental assessment but were concerned with its administration.

EAAC submitted its findings to the minister in two reports. *Reforms to the Environmental Assessment Program - Part 1* was received in October 1991, *Part 2* in January 1992. The reports are still under consideration by the Minister.

HOW IS THE MINISTRY PLANNING TO PROCEED WITH EA REFORM?

There are a number of administrative reforms that can be made to improve the efficiency and effectiveness of the EA program. The ministry is proceeding with these administrative reforms in the short term.

Other reforms will require legislative change. The ministry intends to make an announcement about proposed legislative reforms in the fall of 1992.

WHAT ARE THE GOALS OF THESE SHORT TERM ADMINISTRATIVE REFORMS?

Clarity and guidance, program administration and the EA Board hearings are all being addressed in these administrative reforms. Specific goals have been established in each area and measures are being introduced to achieve them.

1. Clarity and guidance

GOAL:To provide clear direction to proponents and the public so that they understand how the EA process works, and what is expected of them as they follow it.

The ministry plans to achieve this by developing a number of guidelines that will clearly spell out the requirements of the *EA Act* as it applies to particular types of undertakings including: municipal waste, private sector waste, minor and major transportation projects, electrical transmission facilities, hydraulic non-utility generating projects, Ontario Hydro hydraulic projects, major sewage and water facilities, and timber management.

écologiques y compris. De cette collaboration ont émané maintes considérations, rassemblées dans un rapport du ministère de l'Environnement (*Vers une amélioration du Programme d'évaluation environnementale en Ontario*) rendu public par la ministre de l'Environnement, M^{me} Ruth Grier, en décembre 1990.

À la demande de M^{me} Grier, le Comité consultatif des évaluations environnementales a amorcé une consultation du public. Dans le cadre de ses activités, qui se sont déroulées pendant le premier semestre de 1991, le Comité a reçu 170 demandes et a rencontré moult personnes et de nombreux groupes touchés par le programme d'évaluation environnementale.

Dans un premier temps, il est ressorti que le public appuyait, dans l'ensemble, les principes généraux de l'évaluation environnementale, mais avait des réserves quant à son administration.

Le Comité a présenté ses observations à la ministre sous la forme d'un rapport en deux parties, intitulé *Reforms to the Environmental Assessment Program*. La première partie du rapport a été soumise en octobre 1991, la seconde le sera en janvier 1992. La ministre n'a pas encore déposé ses conclusions.

COMMENT LE MINISTÈRE COMPTE-T-IL AMORCER LES RÉFORMES?

On a identifié un certain nombre de lacunes dans la façon dont le programme est administré, d'où les réformes administratives entreprises, à court terme, par le Ministère.

Les autres réformes nécessiteront une modification au texte de loi. Le ministère de l'Environnement espère pouvoir énoncer ses projets de réforme à l'automne 1992.

QUELS SONT LES OBJECTIFS VISÉS PAR CES RÉFORMES ADMINISTRATIVES?

Les réformes portent sur la clarté de la Loi, l'administration du programme et les audiences de la Commission des évaluations environnementales. On a établi des objectifs précis pour chacun de ces trois volets. Les voici :

1. Clarté et direction

OBJECTIF : Offrir des directives précises aux promoteurs et au public, de manière à ce qu'ils

Guidelines will also be developed to assist proponents and the public on:

- the *EA Act* and the approvals process;
- EA planning and approvals;
- the information requirements of core ministries in preparing an EA;
- public consultation;
- the role of the EA coordinator within each review agency

2. EA Program Administration

GOAL:To reduce the average time taken in the review of individual EA documents to one third of the time it takes today; and over the long term, to one-half when there is no hearing.

The long term goal is to reduce the time of the individual EA approvals process (from submission of EA document to issuance of approval where no hearing is held) from 25 months to 12 months.

Several measures will be employed to achieve these goals. These include:

- better workload planning within the EA branch of the ministry;
- concurrent agency/public review of selected EAs on a trial basis with a view to long-term implementation;
- deadlines for document reviews;
- development of a standard review format;
- enhanced staff training
- development of criteria for the assessment of requests for bump-ups, designations and exemptions that will ensure all parties understand why and how these decisions are made;
- streamlining administration of Notices under the Act;
- developing a "parent" model Class EA to ensure consistency of content for all Class EAs and to provide clear direction to proponents for the preparation of Class EAs.

3. EA Board Hearings

GOALS: To manage and administer the EA process so as to minimize, through the use of negotiation and other tools, the number of projects for which a hearing is requested.

puissent comprendre sans ambiguïté leur rôle respectif et les mécanismes du processus d'évaluation environnementale.

Le ministère de l'Environnement compte atteindre cet objectif par la formulation de lignes directrices qui expliqueront clairement les exigences de la *Loi sur les évaluations environnementales* concernant certaines catégories d'entreprises, touchant, par exemple, à la gestion des ordures ménagères, à la gestion des déchets produits par le secteur privé, aux petits et aux grands projets de transport, aux installations électriques, aux travaux d'hydro-électricité du secteur privé, aux travaux d'hydro-électricité d'Ontario Hydro, aux grandes usines de traitement de l'eau et d'épuration des eaux d'égout et à la gestion forestière.

Des lignes directrices porteront également sur :

- la *Loi sur les évaluations environnementales* et la façon dont les demandes sont autorisées;
- la planification et le processus d'autorisation des évaluations environnementales;
- les données dont les ministères concernés ont besoin pour préparer leurs évaluations environnementales;
- l'apport du public;
- le rôle du coordonnateur des évaluations environnementales au sein de chaque organisme examinateur.

2. Administration du programme d'évaluation environnementale

OBJECTIF :Réduire d'un tiers, d'ici 1994, le temps consacré en moyenne à chaque évaluation environnementale; et réduire de moitié, à long terme, le temps consacré aux évaluations lorsqu'il n'y a pas d'audience publique.

Le Ministère vise comme objectif à long terme de réduire de 25 mois à 12 mois le temps consacré à chaque évaluation (de la soumission du document à l'autorisation de l'entreprise proposée, lorsqu'une audience n'est pas requise).

Ces objectifs seront atteints par divers moyens, notamment :

- une meilleure planification des charges de travail au sein de la Direction des évaluations environnementales du ministère;

To reduce the average length of the hearings process (notice, pre-hearing consultations, formal hearing) by half.

To reduce the average length of a formal hearing by half.

To have board decisions rendered within 90 days of the completion of a formal hearing.

Planned initiatives to achieve these goals include:

- enhanced training of board members to improve control and conduct of hearings;
- scoping of issues and topics to be addressed at pre-hearings;
- establishing schedules for each element of the hearing process, such as pre-determined time allocations for each party's presentation of evidence;
- expanded use of mediation techniques;
- providing summaries of important board decisions;
- facilitating access to legal advice for the board; and
- increased dialogue with participants.

WILL THESE ADMINISTRATIVE REFORMS COMPROMISE THE INTEGRITY OF THE *EA ACT*?

No, the ministry remains committed to the principles of the Act and to an Environmental Assessment process where all concerned parties may have input.

WHAT HAS BEEN ACCOMPLISHED TO DATE?

The ministry has already put in place a number of initiatives aimed at providing guidance to proponents and the timely completion of government reviews.

Clear written direction has been provided to a number of proponents during the preliminary stages of their EA process. This has removed uncertainty, accelerated the process and reduced proponent costs.

In the fiscal year 1991-92, 18 reviews were completed. This exceeds the number of reviews completed in the previous four years combined.

- l'examen simultané de certaines évaluations environnementales par le public et par le gouvernement, à titre expérimental au début, mais dans l'intention d'adopter à long terme cette méthode;
- l'établissement de dates d'échéance pour l'examen des documents;
- la normalisation du protocole d'examen;
- une meilleure formation du personnel;
- la formulation de critères précis, qui guideront l'évaluation des demandes de changement de catégorie, de désignation et d'exemption; ces critères garantiront que les parties concernées comprennent bien le processus décisionnel;
- une meilleure administration des avis émis en vertu de la Loi;
- l'élaboration d'un modèle « parallèle » d'évaluation environnementale de portée générale dans le but d'uniformiser les directives sur lesquelles se fondent les promoteurs pour préparer leurs demandes.

3. Audiences de la Commission des évaluations environnementales

OBJECTIFS : Gérer et administrer le processus d'évaluation environnementale de manière à minimiser, par la négociation ou autres mécanismes, le nombre d'entreprises nécessitant une audience.

Réduire de moitié le temps consacré en moyenne au processus d'audience (publication d'avis, consultations en préparation de l'audience, tenue de l'audience).

Réduire de moitié le temps consacré en moyenne aux audiences.

Faire en sorte que la Commission rende ses décisions dans les 90 jours qui suivent la tenue d'une audience.

Afin d'atteindre ces objectifs, le Ministère se propose:

- d'approfondir la formation des membres de la Commission, afin d'améliorer le déroulement des audiences;
- de mieux cerner les questions et les sujets pouvant être traités lors des séances préparatoires;
- d'établir un calendrier pour chacun des volets du processus d'audience, en fixant, par exemple, la limite de temps accordé à chaque partie pour la présentation des preuves;

A document titled *Environmental Assessment Statistical Summary* (PIBS 1923E) is available from the Public Information Centre, as listed below.

FOR MORE INFORMATION, PLEASE CONTACT

Ontario Ministry of the Environment
Public Information Centre
135 St. Clair Ave. W.
Toronto, Ontario M4V 1P5

Tel: (416) 323-4321
1-800-565-4923

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- de favoriser davantage la médiation;
- de résumer les grandes décisions de la Commission;
- de permettre à la Commission d'obtenir plus facilement des conseils juridiques;
- de favoriser le dialogue entre les participants.

CES RÉFORMES ATTÉNUERONT-ELLES LA PORTÉE DE LA *LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES*?

Non. Le ministère de l'Environnement adhère avec toujours autant de volonté aux fondements de la Loi, ainsi qu'au processus d'évaluation environnementale, qui, par sa nature même, invite la participation de toutes les parties concernées.

QU'A-T-ON ACCOMPLI JUSQU'À PRÉSENT?

Le ministère de l'Environnement a déjà mis en branle diverses initiatives, qui aideront les promoteurs à présenter leurs demandes et accéléreront l'examen de celles-ci par le gouvernement.

Plusieurs promoteurs ont déjà reçu (par écrit) des directives précises au cours des étapes préliminaires du processus d'évaluation. Cette initiative a permis de dissiper les doutes, d'accélérer les évaluations et de réduire les coûts assumés par les promoteurs.

Dix-huit évaluations ont été menées à terme pendant l'exercice financier 1991-1992. Ce nombre dépasse celui de toutes les évaluations traitées au cours des quatre années précédentes.

On peut se procurer un document intitulé *Évaluations environnementales - Résumé statistique* (PIBS 1923E) auprès du Centre d'information du ministère de l'Environnement (voir l'adresse ci-dessous).

POUR OBTENIR DE PLUS AMPLES RENSEIGNEMENTS, S'ADRESSER AU :

Ministère de l'Environnement de l'Ontario
Centre d'information
135, avenue St. Clair ouest
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ENVIRONMENT INFORMATION - ENVIRONNEMENT

SPRING 1992 Environment Environnement PRINTEMPS 1992

BACKGROUNDER REFORM OF REVIEW PROCESS LAND USE PLANNING

WHAT IS THE MINISTRY OF THE ENVIRONMENT'S ROLE IN THE LAND USE PLANNING PROCESS?

- MOE is a key review agency under the *Planning Act*. The ministry provides input to the land use planning process to ensure that environmental issues are addressed. This proactive review process ensures that environmental issues are dealt with upfront, thus preventing situations that could be harmful to the environment.

The ministry receives for review from the Ministry of Municipal Affairs, copies of official plans and amendments, plans of subdivisions, and supporting information such as hydrogeological reports and assessments of noise impact.

Currently, there is a need to expand environmental policies in official plans. Thus MOE focuses its reviews on development proposals such as subdivisions and site specific official plan amendments.

WHY IS THERE A NEED FOR REFORM OF THE PROCESS FOR REVIEW OF DEVELOPMENT PROPOSALS?

- Increases in the number and complexity of submissions have led to slower turnaround times for ministry comments. In five years, the number of planning documents being reviewed by ministry staff has more than doubled to 2600 in the past fiscal year.

RENSEIGNEMENTS GÉNÉRAUX SUR LA RÉFORME DU PROCESSUS D'AUTORISATION EN MATIÈRE D'AMÉNAGEMENT DU TERRITOIRE EN ONTARIO

QUEL RÔLE LE MINISTÈRE DE L'ENVIRONNEMENT JOUE-T-IL DANS LE PROCESSUS DE PLANIFICATION?

- Aux termes de la *Loi sur l'aménagement du territoire*, le ministère de l'Environnement est désigné comme l'un des principaux organismes d'examen. Il participe aux activités de planification pour veiller à ce que l'environnement soit pris en considération dans les décisions portant sur l'aménagement du territoire.

Le Ministère reçoit, de la part du ministère des Affaires municipales, des exemplaires des plans d'aménagement officiels et des modifications s'y rapportant, des plans de lotissements et de tout document accessoire, dont les rapports hydrogéologiques, ou les études sur l'impact du bruit.

Estimant qu'il est nécessaire de fortifier les politiques environnementales dans ces plans officiels, le ministère de l'Environnement, dans ses activités d'examen, se concentre sur les projets d'aménagement (les lotissements, par exemple) et les modifications apportées au plan d'aménagement officiel de terrains donnés.

POURQUOI LES RÉFORMES?

- Les projets d'aménagement sont de plus en plus nombreux et de plus en plus complexes, ce qui fait que le Ministère dispose de moins en moins de temps pour présenter ses conclusions.

- Many of the submissions received by the ministry are incomplete. Thus the review process is further delayed as the ministry must go back to the proponent to obtain the information required to assess the submission.

HOW DOES THE MINISTRY PLAN TO REFORM THE LAND USE PLANNING REVIEW PROCESS?

- The ministry is developing guidelines to give clear direction to municipalities, consultants and developers on submissions. This will help make the process more efficient by reducing the number of incomplete submissions.

- Currently some large municipalities comment on areas of submissions where they have specific knowledge and expertise. This eliminates the need for provincial review and comment in these areas and helps to expedite the process.

As part of the broader government review, opportunities to expand municipal participation in the development review process will be examined.

- The ministry is also providing input to the Sewell Commission on Planning and Development Reform in Ontario with respect to long term approaches such as incorporating environmental planning upfront in official plans. This would eliminate or reduce the need to review individual development proposals.

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Le nombre des documents examinés par le Ministère a plus que doublé en cinq ans, pour atteindre le chiffre de 2 600 au cours du dernier exercice.

- De nombreuses demandes sont incomplètes, ce qui retarde davantage le processus d'examen, puisque le Ministère se voit alors obligé de contacter le promoteur pour obtenir les renseignements manquants.

COMMENT LE MINISTÈRE COMPTE-T-IL RÉFORMER LE PROCESSUS D'AUTORISATION?

- Le ministère de l'Environnement formule actuellement des directives précises à l'intention des municipalités, des consultants et des promoteurs. Le processus gagnera en efficacité si le nombre de demandes incomplètes est réduit.

- À l'heure actuelle, certaines grandes municipalités étudient et commentent les aspects des projets qui relèvent de leurs compétences particulières. Cela rend superflus les examens provinciaux et permet d'accélérer les prises de décisions.

Dans le cadre d'un programme provincial mis en branle afin de démêler les rôles propres à chaque pallier gouvernemental, et visant donc à réduire les interventions du gouvernement provincial dans les affaires de compétences municipales, il a été proposé d'examiner les façons d'accroître la participation des municipalités dans le processus d'examen des plans d'aménagement.

- Le ministère de l'Environnement participe également aux travaux de la Commission Sewell sur la réforme de l'aménagement et l'exploitation du territoire en Ontario. Il encouragera surtout la prise d'orientations à long terme, notamment la planification environnementale dans les plans officiels afin d'éliminer, ou du moins réduire, la nécessité d'examiner chaque projet séparément.

POUR OBTENIR DE PLUS AMPLES RENSEIGNEMENTS, S'ADRESSER AU :

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ENVIRONMENT
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ENVIRONNEMENT

SPRING 1992 | Environment Environnement Ontario | PRINTEMPS 1992

BACKGROUNDER: STREAMLINING APPROVALS PROCESS FOR CERTIFICATES OF APPROVAL AND PERMITS

WHAT IS THE MINISTRY OF ENVIRONMENT'S APPROVAL PROGRAM?

The Ontario Ministry of the Environment is responsible for protecting the quality of our province's environment, including air, land and water.

Several pieces of legislation including the *Ontario Water Resources Act* (OWRA), the *Environmental Protection Act* (EPA), the *Pesticides Act* (PA), the *Environmental Assessment Act* (EA), the *Niagara Escarpment Planning and Development Act* (NEPDA) and numerous policies, guidelines and regulations exist to assist the ministry with fulfilling this responsibility.

To maintain control over environmental quality, these Acts require that approvals be obtained before the start of undertakings that may have an impact on the environment. Undertakings requiring approval certificates or permits range from the installation of an exhaust fan in a restaurant to the construction or modification of major water and sewage plants.

Each year the ministry issues over 10,000 certificates of approval and permits in accordance with these Acts and regulations.

RENSEIGNEMENTS GÉNÉRAUX SUR LA SIMPLIFICATION DU PROCESSUS D'OCTROI DE CERTIFICATS D'AUTORISATION ET DE PERMIS

EN QUOI CONSISTE LE PROGRAMME D'AUTORISATION DU MINISTÈRE DE L'ENVIRONNEMENT?

Le ministère de l'Environnement de l'Ontario doit protéger la qualité de l'environnement de la province, notamment la qualité de l'air, du sol et de l'eau.

Divers textes de loi, dont la *Loi sur les ressources en eau de l'Ontario*, la *Loi sur la protection de l'environnement*, la *Loi sur les pesticides*, la *Loi sur la planification et l'aménagement de l'escarpement du Niagara* et de nombreux règlements et maintes politiques et directives aident le ministère à remplir son mandat à l'égard de l'environnement.

En vertu des lois susmentionnées, et dans le but de protéger l'environnement, les promoteurs doivent obtenir une autorisation avant d'entreprendre des travaux susceptibles de se répercuter sur l'environnement. Les travaux qui nécessitent un certificat d'autorisation ou un permis varient grandement, englobant tant l'installation de ventilateurs dans un restaurant que la construction ou la modernisation d'une grande usine de traitement de l'eau ou d'épuration des eaux d'égout.

WHY IS THERE A NEED FOR REFORM OF THE APPROVALS PROCESS?

The high volume of applications, the increasing complexity of the proposals and information required and a large number of incomplete applications have gradually affected the ministry's ability to ensure a timely response to applications.

In keeping with the government's broad commitment to simplify procedures and ensure customer service, the ministry undertook a careful review of its approvals program to determine what could be done to expedite the process.

HOW DOES THE MINISTRY PLAN TO REFORM THE APPROVALS PROCESS?

The ministry will work on several fronts with a view to streamlining the approvals process. Initiatives include:

- Refinement of application forms to make it easier to understand requirements and ensure that necessary information is provided;
- Development of an application guidebook with step by step instructions and explanations to assist applicants in preparing and submitting the application;
- Encouraging pre-application consultations to ensure applicants are aware of ministry requirements at the outset;
- Improving liaisons with interest groups to discuss approvals related concerns;
- Enhanced staff training and guidelines to ensure a consistent level of review; and
- Review of alternative means of dealing with applications for projects that have very little environmental impact in an effort to reduce the overall volume of applications.

Toujours aux termes des lois susmentionnées et des règlements s'y rattachant, le Ministère délivre chaque année plus de 10 000 certificats d'autorisation et permis.

POURQUOI LES RÉFORMES?

Le grand nombre de projets, la complexité toujours accrue des demandes, la quantité de données nécessaires pour évaluer les projets et le nombre considérable de demandes incomplètes sont autant de raisons qui empêchent parfois le Ministère de répondre promptement aux demandes.

Conformément au désir du gouvernement de simplifier les procédés administratifs et d'améliorer les services à la clientèle, le ministère de l'Environnement a entrepris un examen consciencieux de son programme d'autorisation, examen qui lui permettra de trouver des façons d'accélérer le processus.

QUELLE EST LA NATURE DES RÉFORMES PROPOSÉES PAR LE MINISTÈRE DE L'ENVIRONNEMENT?

Soucieux de simplifier en profondeur le processus d'autorisation, le Ministère entreprendra ses réformes sur plusieurs fronts, notamment :

- en raffinant les formulaires de demande, de manière à en clarifier les exigences et à réduire la fréquence des demandes incomplètes;
- en élaborant un guide qui aidera les demandeurs à remplir et à présenter leurs demandes;
- en encourageant les demandeurs à consulter le Ministère avant de faire leurs demandes;
- en parfaisant la formation du personnel et en uniformisant le processus d'autorisation;
- en étudiant d'autres façons de traiter les demandes se rapportant aux travaux qui ont très peu de répercussions sur l'environnement, en vue de réduire le volume des demandes.

WHEN WILL THESE REFORMS BE INTRODUCED?

Some of these initiatives such as development of the guidelines and enhanced staff training are already in process. Others such as the review of alternative means of dealing with applications will be started shortly with a view to completion this year.

WHAT IS THE MINISTRY'S GOAL FOR TURNAROUND OF CERTIFICATES OF APPROVAL AND PERMITS?

The ministry's aim is to shorten the present turnaround time for certificates of approval and permits by 50% or more.

Attainment of this goal is based on ministry agreement with information such as effluent criteria and hydrogeological assessments that accompany the submissions and the receipt of a complete package from the applicant.

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QUAND CES RÉFORMES SERONT-ELLES INTRODUITES?

Certaines de ces réformes, par exemple la clarification des directives et la formation accrue du personnel, sont déjà en cours. D'autres, comme la réduction possible du volume des demandes, seront introduites sous peu dans l'intention de les mener à terme dans le courant de l'année.

QUEL DÉLAI LE MINISTÈRE VISE-T-IL POUR L'OCTROI DES CERTIFICATS D'AUTORISATION ET DES PERMIS?

Le ministère de l'Environnement espère pouvoir réduire de moitié ou davantage le temps nécessaire au traitement des certificats et des permis.

Cet objectif repose sur deux conditions : a) que les données environnementales (p. ex., les normes régissant la qualité des effluents et les études hydrogéologiques) présentées par les promoteurs répondent aux critères d'autorisation du Ministère; et b) que les demandes soient complètes.

POUR OBTENIR DE PLUS AMPLES RENSEIGNEMENTS, S'ADRESSER AU :

Ministère de l'Environnement de l'Ontario
Centre d'information
135, avenue St. Clair ouest
Toronto (Ontario) M4V 1P5
Téléphone : (416) 323-4321
1-800-565-4923

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ENVIRONMENT INFORMATION - ENVIRONNEMENT

CA2ON EV -F11

Government Publications

SUMMER 1992

Ontario Environment Environnement

MUNICIPAL 3Rs FUNDING PROGRAM

The Ontario government has set targets of at least 25 per cent diversion of waste from disposal by 1992 and at least 50 per cent by the year 2000.

The Ministry of the Environment provides funding and technical assistance to Ontario communities for projects which help achieve the provincial waste diversion targets. These programs encourage municipalities to develop self-financed 3Rs methods to better manage their wastes.

MUNICIPAL RECYCLING SUPPORT GRANTS

These grants help municipalities with the planning, implementation, operation and expansion of recycling projects in their communities. They help to reduce waste disposal requirements and provide other environmental benefits to Ontario. The grants cover:

·***Capital costs:*** support for the costs of facilities and equipment needed by the project. Northern communities may be eligible to receive slightly higher levels of funding.

·***Operating costs:*** support for the cost of operating municipal recycling programs. Grant amounts are based on the lesser of a percentage of total costs or the net operational cost (costs less revenues). New municipalities can receive up to five years of funding. In year one, they are eligible to receive up to 50 per cent funding; 40 per cent in year two and 33 per cent in each of the three remaining years. Municipalities that were on the program as of April 1, 1991, and those that have expended the five year eligibility period on or prior to that date, are eligible to receive up to three additional years of funding at 33 per cent.

·***Feasibility studies:*** municipalities can receive grants up to 50 per cent of the costs of feasibility studies to implement a recycling program. The ministry shares in the costs when outside consulting services are necessary.

·***Promotion and advertising:*** grants up to 50 per cent of promotional and advertising costs over five years.

·***Demonstration projects:*** grants up to 100 per cent for the costs of demonstration projects designed to develop innovative recycling method or technologies.

·***Education projects:*** grants up to $15,000 to support unique educational projects designed to raise the awareness and understanding of the 3Rs: reduce, reuse and recycle.

Municipal Recycling Support Grants are currently being changed to address municipal concerns regarding especially high program costs. The objective of these changes is to level transportation costs and overall operational costs in those areas where these costs are justifiably higher than an average level. These changes will be implemented during the ministry's 1992/93 fiscal year.

MUNICIPAL REDUCTION/REUSE GRANTS

All municipalities are eligible to receive assistance for projects aimed at reducing the amount of waste going into the municipal waste stream. These include: projects to encourage less packaging, home composting projects and the development of new product approaches. The grants cover:

·***Capital costs:*** grants of up to 66 per cent of the purchase cost of home composters. Support for other types of reduction projects will be determined on a case-by-case basis.

·***Developmental costs:*** development of creative materials or approaches (such as educational pamphlets and/or promotional programs) may be funded up to 100 per cent to a limit of $25,000 per project.

·***Promotional costs:*** grants of up to 50 per cent are available for municipal solid waste audits and public education.

MUNICIPAL RECOVERY GRANTS

These grants are for projects that recover materials from the mixed waste stream. Municipalities or groups of municipalities are eligible to receive assistance to establish facilities to recover or process paper, compost, aluminum, steel, glass, plastic or other materials. Grants are available for:

·***Capital costs:*** grants up to one third of the costs of facilities.

·***Research/Development costs:*** grants up to 100 per cent of the projects cost of demonstrating or evaluating the proposal.

Applicants are required to send project proposals for Recycling Support Grants, Reduction/Reuse Grants and Waste Recovery Grants to the ministry's Waste Reduction Office. Project proposals should include: a description of the project (home composting, etc); estimated costs of project components; cost sharing arrangements; timing and evidence of municipal commitment to the project.

HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM

This program helps to divert hazardous waste away from municipal landfills and sewage treatment systems. It provides funding to municipalities and community associations to establish multi-material household hazardous waste collection projects. Grants are available for two types of projects: as special waste day/weekend events or as permanent depots.

The amount of funding in one year for any special waste day/weekend event is limited to 50 per cent of the incurred costs, up to $5,000.

Funding can increase by an additional $10,000 for a total maximum grant of $15,000, or a part of $10,000 equivalent to the proportion of the collected volume of waste and crankcase oil diverted from disposal to reuse, recycling or refining, or 50 percent of the total project cost, whichever is less.

Documentation supporting the reported recycling activity is required or the grant will not exceed $5,000. Funding will apply only to direct expenses of conducting a project and not to feasibility studies or consultant's costs.

·***Eligible net expenses*** (after any revenues from service charges, sale to recycling firms or other grants): disbursements to a commercial waste management company (including sorting, transportation and disposal); equipment capital expenditures or rental; collection site rental; insurance; promotion; utilities (electricity, water, etc.) and wages and benefits (if municipal staff is involved).

Upon request, promotional materials will also be provided to grant recipients without charge.

In the case of large municipalities that may require several special waste day/weekend events to satisfy the needs of all population centres, each geographic location that serves distinct areas is eligible for funding, but only once per year.

Small municipalities or unorganized settlements (like the ones that are often found in Northern Ontario) may choose to jointly promote and share the costs of special waste day/weekend events with neighbouring municipalities.

Municipalities that choose to establish permanent depots for household hazardous wastes collection are eligible to receive financial support for capital expenditures through the ministry's Financial Assistance Program.

An application for a Certificate of Approval to operate a hazardous waste collection/transfer site must be completed. Application forms are available at the local Ministry of the Environment regional office. Allow up to two months for the application to be processed.

Ontario Regulation 309 also requires that the grant applicant register as a liquid industrial & hazardous waste generator. In operating a waste transfer facility, an applicant is considered a waste generator when the hazardous wastes are to be shipped for final treatment or disposal. A special procedure has been established for this program. Grant applicants should obtain assistance from the local ministry regional office. The registration application takes approximately two months to process and may be applied for at the same time as the Certificate of Approval.

The ministry also provides funding and technical assistance programs for the establishment, proper maintenance and close-out of waste disposal facilities and the development of waste management master plans.

FINANCIAL ASSISTANCE PROGRAM

The program assists Ontario municipalities to implement new or expand existing waste management facilities such as landfill sites, transfer stations and processing facilities. Eligible activities range from capital costs associated with construction, equipment, land and design, and could include Environmental Assessment Act hearings costs if associated with a master plan.

Funding for disposal facilities is based on comprehensive planning, health and environmental factors.

Private waste management projects will not be funded except where a municipality can demonstrate that it does not have the resources (i.e. technical, financial or otherwise) to establish and operate a waste management facility and has asked the private sector to act on its behalf.

To ensure a fair and equitable distribution of funds to various sizes of municipalities, applicants for municipal grants are placed in one of the following groups:

Group	Population range	Total funding
1*	< 7,500	75%
2*	> 7,500	60%
3	Groups, counties, regional municipalities	60%
4	Individual municipalities	50%

*** Isolated municipality -- one surrounded by unorganized territory that can demonstrate that due to distance, it cannot economically or logistically plan, collect, manage, reuse and/or recycle with neighbouring municipalities.**

WASTE MANAGEMENT MASTER PLANNING PROGRAM

This program assists regional municipalities, counties or groups of municipalities in the development of comprehensive, long-term waste management plans. In the development of a plan, all waste management alternatives (alternative systems, components and sites) within a study area are reviewed. This is conducted on the basis of a hierarchy of preferred waste management options, including the 3Rs, waste processing and treatment, and waste transfer and disposal.

The waste management master plan study is typically co-ordinated by a steering committee comprised of municipal representatives from the study area, the ministry (Waste Reduction Office, District Office and an adviser from the Environmental Assessment Branch) and public representation through a Public Liaison Committee.

The ministry's Waste Reduction Office provides guidance to municipalities on program funding, administration and the conduct of the overall study including public participation. Generic terms of reference for a waste management master plan are provided and are modified by the study steering committee to suite the needs of the study area.

The ministry provides up to 50 per cent funding assistance to hire a consultant to prepare a waste management master plan and to undertake a full program of public participation.

For more information or application forms for any of the municipal 3Rs funding programs, please write or call:

Waste Reduction Office
Ontario Ministry of the Environment
40 St. Clair Avenue West, 7th floor
Toronto, Ontario
M4V 1M2

(416) 325-4440 (in Toronto)

PIBS 1716B
09/92 3M

Le Ministère assume jusqu'à 50 p. 100 du coût des services de consultation pour l'élaboration du plan directeur et pour la mise en place d'un programme de participation du public.

Pour plus de renseignements sur les programmes de financement des activités d'application des 3 « R » ou pour recevoir les formulaires de demande, communiquer avec le :

Bureau de gestion de la réduction des déchets
Ministère de l'Environnement de l'Ontario
40, avenue St. Clair ouest, 7e étage
Toronto (Ontario)
M4V 1M2

(416) 325-4440 (Toronto)

PIBS 1716
09/92 3M

unir leurs efforts et partager le coût d'une journée ou d'un fin de semaine de collecte.

Les municipalités qui optent pour un centre permanent de collecte des déchets domestiques dangereux peuvent aussi recevoir une subvention pour le coût des immobilisations par l'entremise du Programme d'aide financière du Ministère.

Pour exploiter un centre de collecte ou une station de transit des déchets dangereux, il faut obtenir un certificat d'autorisation. Les formulaires de demande sont disponibles dans les bureaux régionaux du ministère de l'Environnement. Le traitement des demandes prend jusqu'à deux mois.

Aux termes du règlement 309 de l'Ontario, le demandeur doit en outre s'inscrire en tant que producteur de déchets industriels liquides et de déchets dangereux. On considère en effet que l'exploitant d'une station de transit est un producteur de déchets lorsque le traitement final ou l'élimination des déchets dangereux en requiert l'expédition. Une marche à suivre particulière a été mise en place aux fins du programme. Les demandeurs doivent s'adresser au bureau régional du Ministère pour obtenir l'aide nécessaire. La demande d'inscription peut être faite en même temps que celle du certificat d'autorisation; son traitement prend environ deux mois.

Le Ministère offre aussi des programmes de soutien financier et technique axés sur la mise en place, l'entretien adéquat et la fermeture d'installations d'élimination des déchets, ainsi que sur l'élaboration de plans directeurs de la gestion des déchets.

PROGRAMME D'AIDE FINANCIÈRE

Le Programme d'aide financière permet aux municipalités ontariennes de mettre en place ou d'agrandir des installations de gestion des déchets comme les lieux d'enfouissement, les stations de transit et les centres de traitement. Sont notamment admissibles au financement le coût des immobilisations associées à la conception et à la construction des installations, à l'achat d'équipement et du terrain ainsi que les dépenses engagées dans le cadre d'audiences tenues aux termes de la *Loi sur les évaluations environnementales*, si elles sont liées à un plan directeur.

Le financement des installations d'élimination des déchets est accordé en fonction de la planification et de facteurs sanitaires et environnementaux.

Les projets privés de gestion des déchets ne sont admissibles au financement que si une municipalité peut démontrer qu'elle ne dispose pas des ressources (techniques, financières ou autres) pour mettre en place et exploiter un centre de gestion des déchets et qu'elle a demandé à une entreprise privée d'agir en son nom.

Pour que les fonds soient distribués de façon équitable, les demandes de subvention sont partagées en quatre groupes selon le tableau ci-dessous.

Groupe	Population	Financement total
1*	< 7 500	75 %
2*	> 7 500	60 %
3	groupes de municipalités, comtés et municipalités régionales	60 %
4	municipalités individuelles	50 %

*** Territoires non constitués en municipalité pour lesquels on peut démontrer qu'il est impossible, sur les plans économique et matériel, de procéder à la planification, à la collecte, à la gestion, à la réutilisation ou au recyclage avec des agglomérations voisines, parce que celles-ci sont trop éloignées.**

PROGRAMME DES PLANS DIRECTEURS DE GESTION DES DÉCHETS

Le programme des plans directeurs de gestion des déchets a été mis sur pied pour venir en aide aux municipalités régionales, comtés et groupes de municipalités qui désirent élaborer une stratégie globale de gestion des déchets à long terme. L'élaboration d'un plan pour une région donnée comprend l'examen de toutes les options de gestion des déchets (les systèmes, les composantes et les lieux possibles). On examine les options en commençant par celles auxquelles on accorde la priorité, notamment les 3 « R », le traitement des déchets, et le transfert et l'élimination des déchets.

Les plans directeurs sont en principe coordonnés par un comité regroupant des délégués municipaux des régions d'étude, des représentants du Ministère (une personne du Bureau de gestion de la réduction des déchets, une personne du bureau de district et un conseiller de la Direction des évaluations environnementales) et le public, représenté par un comité de liaison.

Le Bureau de gestion de la réduction des déchets du Ministère renseigne les municipalités sur le financement et l'administration du programme, ainsi que sur le déroulement de l'étude, entre autres en ce qui a trait à la participation du public. Les modalités du plan directeur de gestion des déchets, qui sont pré-établies, sont modifiées par le comité de direction selon les besoins de la région à l'étude.

AIDE FINANCIÈRE POUR LA RÉDUCTION ET LA RÉUTILISATION DES ORDURES MÉNAGÈRES

Toutes les municipalités peuvent recevoir une aide financière pour des projets visant la réduction du flux des ordures ménagères. Il s'agit entre autres de projets décourageant le suremballage, de programmes de compostage domestique et de projets encourageant l'adoption de nouvelles attitudes à l'égard des produits. Le financement est accordé pour les aspects suivants de ces projets :

·***Coût des immobilisations :*** les subventions couvrent jusqu'à 66 p. 100 du coût de l'achat de boîtes à compostage domestique. D'autres types de projets de réduction pourront être financés selon leur mérite.

·***Frais de conception :*** la mise au point de matériel original et de méthodes ingénieuses (par exemple, dépliants éducatifs et programmes de promotion) peut être financée à 100 p. 100, jusqu'à concurrence de 25 000 $ par projet.

·***Dépenses de promotion :*** des subventions pouvant s'élever jusqu'à 50 p. 100 sont accordées aux municipalités pour la comptabilité des déchets solides et la sensibilisation du public.

AIDE FINANCIÈRE POUR LA RÉCUPÉRATION DES ORDURES MÉNAGÈRES

Ce programme d'aide financière intéresse les projets de récupération de matériaux divers. Les municipalités ontariennes peuvent, indépendamment ou en groupe, recevoir une aide financière pour la mise en place d'installations destinées à la récupération ou au traitement du papier, du compost, de l'aluminium, de l'acier, du verre, du plastique ou d'autres matériaux. Le financement porte sur les coûts suivants :

·***Coût des immobilisations :*** subventions couvrant jusqu'à un tiers du coût des installations.

·***Coût de la recherche et du développement :*** subventions couvrant jusqu'à 100 p. 100 du coût projeté de l'évaluation du projet mis de l'avant ou de la démonstration de sa faisabilité.

Pour obtenir de l'aide financière pour la réduction, la réutilisation ou la récupération des ordures ménagères, les demandeurs doivent faire parvenir une description du projet au Bureau de gestion de la réduction des déchets du ministère de l'Environnement. Ils doivent préciser le type de projet dont il s'agit (compostage domestique, etc.), le coût estimatif de ses divers aspects, une description des dispositions prises quant au partage des coûts, un calendrier d'exécution et une preuve de l'engagement de la municipalité à l'égard du projet.

PROGRAMME DE COLLECTE DES DÉCHETS DOMESTIQUES DANGEREUX

Ce programme permet de prévenir la mise en décharge de déchets dangereux ou leur rejet dans les égouts. Il offre aux municipalités et aux groupes communautaires une aide financière pour la mise en place de projets de collecte de nombreux types de déchets domestiques dangereux. Deux genres de projets sont admissibles : la tenue de journées ou de fins de semaine de collecte et l'aménagement de centres de collecte permanents.

Pour une année donnée, le financement de journées ou de fins de semaine de collecte est limité à 50 p. 100 des dépenses engagées, jusqu'à concurrence de 5 000 $.

Le financement peut être augmenté de 10 000 $ (pour un total de 15 000 $) ou de la fraction de 10 000 $ correspondant au pourcentage du volume de peinture au latex, de peinture à l'huile et d'huile moteur qui sera réutilisé ou raffiné plutôt qu'éliminé.

On doit soumettre des documents à l'appui des activités de recyclage ci-dessus, sans quoi la subvention ne dépassera pas 5 000 $. Le financement ne porte que sur les coûts directs du projet : les études de faisabilité et les honoraires de consultants ne sont pas admissibles.

·***Les dépenses nettes admissibles*** (après déduction d'autres subventions, des redevances perçues et du montant des ventes à des entreprises de recyclage) comprennent notamment les sommes versées à une entreprise de gestion des déchets (pour le tri, le transport et l'élimination des déchets), le coût de l'achat ou de la location d'équipement, de la location du lieu de collecte, des assurances, de la promotion et des services publics (électricité, eau, etc.), ainsi que les salaires et avantages sociaux (si des employés municipaux sont en cause).

Les bénéficiaires d'une subvention peuvent aussi recevoir sur demande du matériel de promotion gratuit.

Dans le cas des grandes municipalités où la densité de la population rend nécessaire la tenue de plusieurs journées ou fins de semaine de collecte, une subvention pourra être obtenue pour chaque lieu de collecte desservant une aire géographique distincte, mais seulement une fois par année.

Les petites municipalités ou les agglomérations non constituées en municipalité (comme on en retrouve beaucoup dans le nord de l'Ontario) voisines pourront

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ÉTÉ 1992

Ontario Environment Environnement

PROGRAMMES DE FINANCEMENT DES ACTIVITÉS D'APPLICATION DES 3 « R »

Le gouvernement de l'Ontario veut réduire la quantité des déchets destinés à l'enfouissement d'au moins 25 p. 100, en 1992, et d'au moins 50 p. 100, d'ici l'an 2000.

Le ministère de l'Environnement accorde une aide technique et financière aux collectivités ontariennes qui mettent sur pied des projets pouvant aider la province à atteindre ses objectifs en matière de réacheminement des déchets. Les programmes offerts encouragent les municipalités à améliorer la gestion de leurs déchets en mettant en place des procédés autofinancés fondés sur les principes des 3 « R ».

AIDE FINANCIÈRE POUR LE RECYCLAGE DES ORDURES MÉNAGÈRES

Les subventions aident les municipalités à planifier et à mettre en oeuvre des activités de recyclage, ainsi qu'à en étendre la portée. De tels projets sont salutaires pour l'environnement en Ontario, entre autres parce qu'ils contribuent à réduire les besoins en matière d'élimination des déchets. Le financement est accordé pour les aspects suivants de ces projets :

·***Coût des immobilisations :*** subvention pour le coût des installations et des équipements nécessaires au projet. Le taux de financement peut être légèrement plus élevé pour les municipalités du nord de la province.

·***Dépenses d'exploitation :*** subvention pour les dépenses de fonctionnement des programmes de recyclage des ordures ménagères. Le montant de la subvention correspond à un pourcentage du moindre des deux montants suivants : les dépenses totales ou le coût d'exploitation net (dépenses moins revenus). Les municipalités qui n'ont jamais profité du programme peuvent recevoir une subvention pendant un maximum de cinq ans. Le financement est de l'ordre de 50 p. 100 la première année, de 40 p. 100 la seconde et de 33 p. 100 les troisième, quatrième et cinquième années. Les municipalités qui profitent du programme depuis le 1er avril 1991 et celles qui en ont profité par le passé peuvent recevoir le financement pendant trois années additionnelles.

·***Études de faisabilité :*** les municipalités peuvent recevoir une subvention couvrant jusqu'à 50 p. 100 du coût des études sur la faisabilité des programmes de recyclage. Le Ministère assume une partie des coûts engagés quand les services de consultants doivent être retenus.

·***Promotion et publicité :*** les subventions couvrent jusqu'à 50 p. 100 des coûts de promotion et de publicité sur cinq ans.

·***Projets de démonstration :*** les subventions couvrent jusqu'à 100 p. 100 des coûts de projets de démonstration portant sur l'élaboration de méthodes ou de techniques de recyclage novatrices.

·***Projets éducatifs :*** jusqu'à 15 000 $ sont accordés aux projets originaux de sensibilisation et d'éducation portant sur les 3 « R » : réduire, réutiliser, recycler.

Le Ministère a entrepris de modifier le programme d'aide au recyclage des ordures ménagères pour mieux aider les municipalités à assumer le coût particulièrement élevé de certains projets. Les changements porteront sur le coût du transport et les coûts de fonctionnement lorsqu'ils sont plus élevés que la moyenne. Ils seront mis en vigueur pendant l'exercice financier de 1992-1993.

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SUMMER 1992

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ONTARIO'S ENVIRONMENTAL PROTECTION INDUSTRY - BACKGROUNDER

The greening of Canadian industries is fostering an environmental protection industry in Ontario which is estimated to grow by an average of 14 per cent every year for the next five years. In 1990, Ontario's environmental protection industry had estimated total annual sales of $2.5 billion, according to a study by management consultants Ernst & Young. That is more than 40 per cent of an estimated $6 billion in total annual sales for the environmental protection industry in Canada, according to figures supplied by Industry, Science and Technology Canada. According to a 1989 study by Woods Gordon Management Consultants, now part of Ernst & Young, total annual sales for Ontario's environmental protection industry were about $2 billion in 1987.

At present, the industry in Ontario includes some 1,500 to 2,000 companies that produce specialized goods and services to prevent pollution or to clean up polluted air, water and land. Major sectors of the industry include manufacturing and on-site construction of environmental equipment as well as solid and hazardous waste management and recycling services, laboratory services and engineering consultant services. The 1990 estimated revenues of Ontario's environmental protection industry were:

• Construction of environmental systems	$250-300 million
• Materials, equipment, instruments and supplies	$550-600 million
• Engineering and other consulting	$175-200 million
• Laboratory and analytical services	$50-75 million
• Solid and hazardous waste management	$1.3-1.5 billion

GROWTH PATTERNS

Sectors

Between 1987 and 1990, the major areas of growth included municipal water and sewage treatment, laboratory services, recycling and hazardous waste treatment. The hazardous and waste treatment industry predicts the fastest rate of growth at 15-21 percent over the next five years. Other rates of growth are:

• air pollution control companies at 9-13 per cent;

• water pollution control companies at 10-15 per cent.

Employment

In 1987, the environmental protection industry employed an estimated 28,000 people according to the 1989 study. By 1990, employment in the industry was estimated to be about 30,000 people. This puts the environmental protection industry on a par with other key industries in Ontario. Ontario employment by industry in 1990 was:

• Motor vehicle parts and accessories	49,900
• Motor vehicle assembly	34,500
• Environmental protection industry	30,000
• Machinery	26,000
• Chemicals	24,000
• Iron and steel	20,000
• Pulp and paper	14,400

Today, there are shortages of hydrogeologists. Future employment opportunities include jobs for engineers, environmental scientists and air quality chemists and technicians.

Sources of demand

The greening of industry is driven by government legislation and the environmental awareness of business people and consumers.

Factors increasing demand for environmental products and services include:

• economic growth, which creates the need for environmental products and services at new industrial sites so that they will meet existing and proposed standards;

• population growth, which generates one-time demand for the necessary environmental infrastructure - such as water treatment and sewage treatment plants - as well as on-going services such as waste management;

• consumer demand for green products, which in turn leads to demands by product makers to their suppliers and distributers for green products;

• increased corporate environmental consciousness, linked to the value of a strong record on environmental matters;

• government regulation and legislation, enforced through standards or taxes and fees.

At the federal and interprovincial levels such regulations include:

• *The Canadian Environmental Protection Act* which regulates the manufacture and use of a range of toxic substances;

• *The Environmental Assessment and Review Process* which sets the criteria for evaluating certain private and public sector projects;

• *The Fisheries Act* which protects fish habitats;

• *The Canadian Shipping Act* and *Transportation of Dangerous Goods Act* which regulate the transportation of hazardous liquid and solid materials;

• *The Green Plan* which includes plans to clean up coastal and inland waterways and hazardous waste sites as well as to reduce toxic effluent discharges and emissions of nitrogen oxide and volatile organic compounds;

• *The National Packaging Protocol* adopted by the Canadian Council of Ministers of the Environment which aims to reduce packaging wastes by 50 per cent based on 1988 levels.

At the provincial level, Ontario has led the country in environmental protection programs and regulations. Some of the province's existing programs to protect the environment and to prevent pollution include:

• *The Municipal/Industrial Strategy for Abatement (MISA)* - The aim of MISA is the virtual elimination of toxic discharges into Ontario's lakes and rivers. The program has targeted municipal sewage treatment plants and nine industrial sectors. At present, the companies in the industrial sectors have finished the monitoring phase of the program. The data collected is being used to develop regulations with specific limits on the effluent discharged into the waterways.

• *Municipal sewer use by-law* - The ministry has a model bylaw which sets limits on the contaminants discharged into municipal sewer systems. The bylaw also increases the amount which industries pay for sewage treatment. Today, 36 municipalities have adopted the bylaw.

• *Countdown Acid Rain* - The six-year-old program will cut sulphur dioxide emissions from Ontario's four biggest producers of acid gas - Inco Ltd., Falconbridge Ltd., Ontario Hydro and Algoma Steel Corporation Ltd.,- to 665 kilotonnes (kt) by 1994 from 1,987 kt in 1980. Inco and Falconbridge already have taken many steps to control acid gas emissions. Ontario Hydro is expected to spend an estimated $2.68 billion before the year 2000 to meet the program's acid gas targets. Algoma has met its targets by controlling production levels at its iron ore sintering plant in Wawa.

• *The Waste Management Act* - The act, which came into effect in April 1992, gives the province the power to regulate packaging and products; require waste audits and work plans from industries; extend 3Rs programs to most municipalities; and make approvals easier for recycling, municipal composting and material recovery depots.

• *Waste Reduction Action Plan* - The plan will help to cut waste going to disposal sites by at least 25 per cent by 1992 and at least 50 per cent by 2000. The plan includes measures to reduce at source the volume of waste going to landfill sites, to develop financial and technical systems to divert materials to productive uses and to foster new markets for materials recovered through 3Rs programs.

• *The Municipal Blue Box program* - The program is a joint venture of the ministry, OMMRI: Corporations in

support of Recycling and municipalities. At present about three million households are served by municipal blue box programs. Materials collected for recycling include newspapers, glass and metal containers and plastic soft drink bottles.

MARKETS - TODAY AND TOMORROW

Canadian

In 1990, exports to other provinces and countries accounted for about 25 per cent of Ontario's environmental protection industry's product sales and some 10-15 per cent of its service sales. The Canadian market is expected to grow by eight per cent per year to $12 billion by 2000.

In the past, Ontario lead the way in environmental regulations and laws. Its policies will continue to influence regulatory developments throughout Canada and growth in the environmental protection industry.

The key principles guiding the development of policies and regulations in Ontario are:

• *Pollution prevention* - The Ministry of the Environment wants to prevent pollution at the source. This may require industries to change production to include closed loop processes as well as substituting raw materials and redesigning products to eliminate toxic wastes.

• *Multi-Media approach* - The ministry is looking at the consequences of industrial activities in terms of their effects on water, air and surrounding land.

• *Promoting green industries* - The Ontario government is promoting the development of green industries and technologies to strengthen Ontario's position as one of the world's leaders in the industry.

International

Other markets include the United States, Mexico and Europe.

The U.S. market is presently estimated at $115 - $130 billion (U.S.) per year. It is expected to grow to $154 billion (U.S.) by the year 2000. Estimates of the U.S. market by 2000 are:

• Air pollution control	$44.1 billion (U.S.)
• Water pollution control	$64.1 billion (U.S.)
• Land pollution control	$46.1 billion (U.S.)

The Mexican market for pollution control equipment is expected to be about $10 billion (U.S.) by the year 2000.

In 1989, the European market, excluding Eastern Europe, was estimated to be as high as $100 billion (U.S.) for environmental protection goods and services. Major developments in European Community environmental policy are expected to shape future demand. The Eastern European market for environmental protection equipment is expected to grow to about $16 billion (U.S.) in the coming years.

The Study

The 1992 study included a mail survey of 2,133 companies. A total of 549 companies in the environmental protection industry replied.

Copies of *Study of the Environmental Protection Industry June 1992,* (PIBS 1966E) have been distributed to major government and regional libraries and the ministry's Public Information Centre at 135 St. Clair Ave.,W., Toronto, Ont. M4V 1P5. (416) 323-4321 or 1-800-565-4923. Copies may be bought for $15.50 at Publications Ontario, Main Floor, 800 Bay St., Toronto, Ontario. M7A 1N8. (416) 326-5300 or 1-800-668-9938.

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Des exemplaires du document intitulé *Study of the Environmental Protection Industry, June 1992* (PIBS 1966E) ont été distribués aux bibliothèques de la fonction publique, aux principales bibliothèques régionales et au Centre d'information du ministère de l'Environnement, au 135, avenue St. Clair ouest, Toronto (Ontario) M4V 1P5. Téléphone : (416) 323-4321 ou 1-800-565-4923. On peut en faire l'achat pour la somme de 15,50 $ chez Publications Ontario, rez-de-chaussée, 800, rue Bay, Toronto (Ontario) M7A 1N8; téléphone : (416) 326-5300 ou 1-800-668-9938.

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Hydro compte dépenser la somme approximative de 2,68 milliards de dollars d'ici la fin de l'an 2000 afin d'atteindre les objectifs fixés par le programme. La société Algoma a déjà atteint son objectif en modifiant les plans de production à son usine de minerai de fer de Wawa.

• La *Loi sur la gestion des déchets*, en vigueur depuis avril 1992, confère au gouvernement le pouvoir de réglementer l'emballage et les produits, de sommer les industries à effectuer des audits de leurs déchets et à élaborer des plans de travail, d'étendre le programme des 3 « R » à la plupart des municipalités et de faciliter le processus d'autorisation des centres de recyclage, de compostage et de récupération.

• Le Plan d'action en matière de réduction des déchets, qui aidera à réduire d'au moins 25 p. 100, en 1992, et d'au moins 50 p. 100, d'ici l'an 2000, la masse des déchets destinés à l'enfouissement. Le Plan élabore diverses mesures qui permettront de diminuer à la source la quantité de déchets produits, de récupérer les ressources secondaires et de créer de nouveaux marchés pour les matériaux récupérés grâce au programme des 3 « R ».

• Le programme de la boîte bleue, entreprise conjointe du Ministère, d'Ontario Multi-Material Recycling Inc. et des municipalités. Environ trois millions de foyers participent actuellement au programme grâce auquel sont récupérés, à des fins de recyclage, les journaux et les contenants en fer-blanc, en verre et en plastique.

LES MARCHÉS : AUJOURD'HUI ET DEMAIN

Au Canada

En 1990, les exportations de produits et services de dépollution vers les autres provinces et à l'étranger ont représenté respectivement environ 25 p. 100 et de 10 à 15 p. 100 du chiffre d'affaires de l'industrie ontarienne de la PE. Le marché canadien devrait profiter d'un taux de croissance annuel de 8 p. 100 et produire des recettes de 12 milliards de dollars d'ici à l'an 2000.

L'Ontario a toujours ouvert la voie au chapitre des lois et des règlements environnementaux. Au cours des prochaines années, il est clair que les politiques ontariennes continueront à influer sur l'orientation des règlements environnementaux et sur l'essor de l'industrie de la protection environnementale au pays.

Voici les principes clés qui éclairent les politiques et les règlements de l'Ontario :

• La prévention de la pollution. Désireux d'enrayer la pollution à la source, le ministère de l'Environnement incite les industries à opter pour des procédés « en boucle fermée », à employer des matières brutes moins dommageables pour l'environnement et à changer la conception des produits contenant des substances toxiques.

• L'approche multimilieux. Le Ministère étudie les effets cumulatifs des activités industrielles sur la qualité de l'eau, de l'air et des sols.

• La promotion de l'économie « verte ». Conscient du rôle de chef de file que joue l'Ontario au sein de l'industrie de la PE, le gouvernement de la province encourage de diverses façons le marché des produits, des services et des techniques à valeur écologique.

À l'étranger

L'Ontario vise d'autres marchés, dont ceux des États-Unis, du Mexique et de l'Europe.

Les États-Unis représentent à eux seuls un marché annuel de 115 à 130 milliards de dollars (US). Ce marché devrait s'élever à 154 milliards (US) d'ici à l'an 2000 :

• Lutte contre la pollution atmosphérique :	44,1 milliards (US)
• Lutte contre la pollution de l'eau :	64,1 milliards (US)
• Lutte contre la pollution des sols :	46,1 milliards (US)

D'ici à l'an 2000, le marché mexicain des équipements antipollution devrait représenter environ 10 milliards de dollars (US).

Le marché européen (hormis l'Europe de l'Est) des produits et des services de protection environnementale a été évalué à 100 milliards (US) en 1989. L'intensification des politiques environnementales au sein de la Communauté européenne devrait modeler la demande future. Au cours des prochaines années, l'Europe de l'Est devrait offrir des débouchés chiffrés à environ 16 milliards (US) aux fournisseurs d'équipement de PE.

L'étude

L'étude réalisée en 1992 s'appuie sur un sondage diffusé auprès de 2 133 entreprises et auquel ont répondu 549 entreprises associées à l'industrie de la protection environnementale.

- Industrie sidérurgique : 20 000
- Industrie des pâtes et papiers : 14 400

On connaît actuellement une pénurie d'hydrogéologues. L'ingénierie, les sciences de l'environnement, la chimie atmosphérique et les techniques d'amélioration de la qualité de l'air sont tous des domaines promis à un brillant avenir.

Sources de la demande

Le verdissement des entreprises doit son essor surtout aux lois environnementales et à la prise de conscience, toujours plus répandue, des gens d'affaires et des consommateurs.

La demande accrue pour les biens et services de protection environnementale tient notamment des facteurs suivants :

- la croissance économique, créatrice de nouveaux besoins dans les nouvelles usines soucieuses de se conformer aux normes environnementales en vigueur et à l'étude;

- la croissance démographique, propice au développement de l'infrastructure, dont les usines de traitement de l'eau et d'épuration des eaux usées, et des services permanents de gestion;

- l'engouement des consommateurs pour des produits respectueux de l'environnement, engouement qui façonne les stratégies d'offre des fabricants et de leurs fournisseurs et distributeurs;

- la sensibilisation accrue des dirigeants d'entreprises, qui reconnaissent les avantages commerciaux et médiatiques du verdissement;

- les lois et les règlements, mis en vigueur par l'imposition de normes et la perception de taxes et de redevances.

Le gouvernement fédéral et les provinces disposent des moyens suivants :

- La *Loi sur la protection de l'environnement (Canada)*, qui régit la fabrication et l'emploi de tout un éventail de substances toxiques;

- Le *processus d'évaluation environnementale et d'examen*, qui établit les critères régissant l'autorisation de certains travaux des secteurs privé et public;

- La *Loi sur les pêches (Canada)*, qui vise à protéger les habitats des poissons;

- La *Loi sur la marine marchande du Canada* et la *Loi sur le transport des marchandises dangereuses*, qui portent sur le transport de matières liquides et solides dangereuses;

- Le *Plan vert*, qui prévoit l'assainissement des eaux littorales et des eaux qui se trouvent à l'intérieur des terres, ainsi que la gestion des déchets toxiques, des effluents toxiques et des émissions d'oxydes d'azote et de composés organiques volatils;

- Le *protocole national sur l'emballage* adopté par le Conseil canadien des ministres de l'environnement, qui vise à réduire de moitié le volume des emballages par rapport à celui de 1988.

Le gouvernement de l'Ontario s'illustre au Canada par le rôle de premier plan qu'il y joue en matière de protection de l'environnement. Voici quelques-uns des règlements et des programmes mis de l'avant par l'Ontario pour lutter contre la pollution :

- La *Stratégie municipale et industrielle de dépollution (SMID)*, qui a pour objectif d'éliminer pratiquement toutes les substances toxiques présentes dans les effluents déversés dans les lacs et les rivières de la province. Elle porte sur les usines municipales d'épuration des eaux usées et sur neuf secteurs industriels. Les entreprises des secteurs d'activité visés par la Stratégie ont déjà terminé la première étape du programme, celle de la surveillance. Les données recueillies serviront à établir des normes précises sur la qualité des effluents rejetés dans les eaux de l'Ontario.

- Le ministère de l'Environnement dispose d'un règlement municipal modèle qui limite les concentrations des substances qui peuvent être rejetées dans les réseaux d'égouts municipaux. Ce règlement municipal accroît également le montant que doivent payer les industries pour l'épuration des eaux usées. À ce jour, ce règlement a été adopté par 36 municipalités.

- Le programme *Les pluies acides, un compte à rebours*, en vigueur depuis six ans, vise à réduire les émissions d'anhydride sulfureux des quatre grands producteurs de gaz acides, à savoir : Inco Ltée, Falconbridge Ltée, Ontario Hydro et Aciers Algoma Ltée. Des 1 987 kilotonnes qu'elles étaient en 1980, les émissions devront chuter à 665 kilotonnes d'ici 1994. Les sociétés Inco et Falconbridge ont déjà pris des mesures pour réduire leurs émissions. Ontario

ENVIRONMENT INFORMATION - ENVIRONNEMENT

ÉTÉ 1992

Ontario Environment Environnement

L'INDUSTRIE ONTARIENNE DE LA PROTECTION ENVIRONNEMENTALE

Le verdissement des entreprises canadiennes a entraîné un essor formidable de l'industrie de la protection environnementale (PE) en Ontario. Cette industrie est en effet appelée à croître de 14 p. 100 par année pendant les cinq prochaines années. Selon une étude réalisée par le cabinet de conseillers en gestion Ernst & Young, l'industrie de la PE de l'Ontario a enregistré un chiffre d'affaires de 2,5 milliards de dollars en 1990, soit plus de 40 p. 100 du chiffre d'affaires annuel de l'industrie canadienne de la PE, estimé à 6 milliards par Industrie, Science et Technologie Canada. D'après une étude réalisée en 1989 par le cabinet de conseillers en gestion Woods Gordon, maintenant associé au cabinet Ernst & Young, l'industrie de la PE ontarienne aurait réalisé un chiffre d'affaires de 2 milliards en 1987.

À l'heure actuelle, l'industrie de la protection environnementale ontarienne comprend entre 1 500 et 2 000 entreprises offrant des biens et des services de prévention et de lutte contre la pollution de l'air, de l'eau et des sols. Elle se divise en trois grands secteurs : fabrication en usine et sur place d'équipements de protection environnementale; gestion des déchets solides et dangereux; et services de recyclage, de laboratoire et d'ingénierie. Voici une approximation des recettes réalisées en 1990 :

• Systèmes de protection environnementale (fabrication et installation) :	250 - 300 millions
• Matériel, instruments et équipements industriels :	550 - 600 millions
• Services d'ingénierie et de consultation :	175 - 200 millions
• Services de laboratoire et d'analyse :	50 -75 millions
• Gestion des déchets solides et dangereux :	1,3 - 1,5 milliard

TENDANCES DE CROISSANCE

Secteurs d'activité

Entre 1987 et 1990, les secteurs les plus dynamiques ont été ceux du traitement de l'eau et de l'épuration des eaux d'égout, des services de laboratoire, des services de recyclage et du traitement des déchets dangereux. Ce dernier secteur devrait connaître la plus forte croissance (de 15 à 21 p. 100) au cours des cinq prochaines années. Parmi les autres secteurs en pleine croissance, citons notamment :

• celui de la lutte contre la pollution atmosphérique, dont le taux de croissance est évalué à entre 9 et 13 p. 100); et

• celui de la lutte contre la pollution de l'eau, dont le taux de croissance est évalué à entre 10 et 15 p. 100.

Emploi

D'après l'étude de 1989 citée plus haut, l'industrie de la PE employait quelque 28 000 personnes en 1987. En 1990, cet effectif serait passé à environ 30 000 personnes. Ces chiffres révèlent tout le dynamisme de l'industrie de la PE, qui n'a rien à envier aux autres industries maîtresses de l'Ontario. Voici quelques données comparatives :

• Industrie des pièces et des accessoires d'automobiles :	49 000
• Industrie de l'assemblage d'automobiles :	34 500
• Industrie de la protection environnementale :	30 000
• Industrie de la fabrication de machines :	26 000
• Industrie de la fabrication de produits chimiques :	24 000

ENVIRONMENT
INFORMATION
ENVIRONNEMENT

Ontario Environment Environnement

SUMMER 1992 ÉTÉ 1992

THE 1990 INDUSTRIAL DIRECT DISCHARGE REPORT

THE REPORT:

- This is the 13th year that the Ministry of the Environment has issued a report on the performance of the industries which discharge directly into Ontario's lakes and rivers.

- Prior to 1985, the ministry reported only those industries which discharged their effluent into the Great Lakes. At that time, the ministry assessed the companies on their annual average discharges.

- Since 1985, the ministry has reported on industries which discharge their effluent directly into Ontario's waterways and has assessed the industries on their average monthly discharges.

- The ministry assessed 167 plants for the 1990 report, 170 plants for the 1989 report and 168 plants for the 1988 report.

- Fewer plants were monitored in 1990 than in 1989 as four companies closed their doors and only one new plant was added to the list.

- Of the 167 plants assessed in this year's report, 138 plants are part of the Municipal/Industrial Strategy for Abatement (MISA) monitoring program. There are about 300 companies involved in the program today.

- Most of the province's estimated 12,000 - 18,000 industrial plants are not included in the report as they discharge their waste into municipal sanitary sewers.

RAPPORT SUR LES EFFLUENTS INDUSTRIELS DÉVERSÉS DIRECTEMENT DANS LES COURS D'EAU — 1990

APERÇU

- Le ministère de l'Environnement a rendu public son treizième rapport annuel sur les efforts de réduction de la pollution déployés par les industries qui déversent leurs effluents directement dans les lacs et les cours d'eau de la province.

- Avant 1985, le Ministère n'évaluait que les industries qui déversaient leurs effluents dans les Grands Lacs. L'évaluation portait alors sur une moyenne annuelle des effluents déversés par chaque entreprise.

- Depuis 1985, le Ministère surveille les entreprises qui déversent leur effluents directement dans les lacs et les cours d'eau de la province et l'évaluation est fondée sur une moyenne mensuelle des effluents.

- La surveillance du Ministère portait sur 167 usines en 1990, comparativement à 170 en 1989 et à 168 en 1988.

- La réduction du nombre d'usines surveillées entre 1989 et 1990 est attribuable à la fermeture de quatre d'entre elles et au fait que seulement une usine est venue s'ajouter à la liste en 1990.

- Un grand pourcentage des usines visées, soit 138 sur 167, font également l'objet d'une surveillance dans le cadre de la Stratégie municipale et industrielle de dépollution (SMID). Environ 300 entreprises participent à cette stratégie à l'heure actuelle.

THE ASSESSMENT CRITERIA:

· The majority of spills are not included in the report because they often pass by plants' sampling equipment. For more information on spills, please see the Spills Action Centre Summary Report of 1990 Occurrences (PIBS 1952E)

· Plants were out of compliance if their effluent exceeded ministry standards once. Effluent is the waste water discharged into the lake or river either by an industry or a municipal sewage treatment plant.

· The number of times a plant was out of compliance does not necessarily reflect the severity or the magnitude of the discharge. Nor does it reflect the effect which the discharge had on the environment.

· The Ministry of the Environment employs a variety of approaches to control direct discharges of pollutants to lakes and rivers. The approaches include voluntary measures or guidelines as well as Control Orders and Certificates of Approval which have the force of law behind them.

· The requirements in Control Orders and Certificates of Approval are often based on the specific conditions at the site.

THE RESULTS:

· In 1990:

- 77 (or 46 per cent) of the 167 plants assessed met their monthly average limits;

- 90 (or 54 per cent) of the 167 plants assessed did not meet their monthly average limits;

- 44 (or 27 per cent) of the 161 plants which have been assessed since 1988 met their effluent requirements for the third year in a row;

- 57 plants (or 35 per cent) failed to comply with their effluent requirements for three years in a row;

- plants met their monthly limits 7,196 times (or 90 per cent) of the 7,966 times they were monitored.

· La plupart des 12 000 à 18 000 installations industrielles de la province ne sont pas visées par ce rapport puisque leurs effluents sont déversés directement dans les égouts municipaux.

CRITÈRES D'ÉVALUATION

· Beaucoup de déversements ne figurent pas dans le rapport, car la plupart d'entre eux ne sont pas détectés par l'équipement de surveillance de l'usine. On peut obtenir de plus amples renseignements sur les déversements en consultant le rapport de 1990 préparé par le Centre d'intervention en cas de déversement, intitulé *Spills Action Centre Summary Report of 1990 Occurrences* (PIBS 1952E).

· Toute usine dont les effluents ne respectaient pas les limites établies par le Ministère était considérée non conforme, même si les limites n'ont été dépassées qu'une seule fois au cours de la période de surveillance. Les effluents sont les eaux usées déversées dans un lac ou une rivière par une entreprise ou une station municipale d'épuration des eaux usées. · Le nombre de fois que les effluents d'une entreprise n'étaient pas conformes aux normes établies n'est pas nécessairement une indication de la toxicité ou de l'ampleur du rejet. Il n'est pas non plus une mesure de son impact sur l'environnement.

· Le ministère de l'Environnement a accès à certains recours pour réglementer le rejet d'effluents polluants directement dans les lacs et les cours d'eau. Certaines industries adoptent volontairement leurs propres mesures et lignes directrices dans le but d'atteindre les objectifs fixés par le Ministère, mais d'autres doivent y être contraintes par des arrêtés d'intervention et des certificats d'autorisation.

· Les mesures correctrices exigées par les arrêtés d'intervention et les certificats d'autorisation sont généralement adaptées aux conditions qui prévalent à l'usine.

BILAN

· En 1990 :

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ENVIRONMENT INFORMATION - ENVIRONNEMENT

SUMMER 1992 Environment Environnement Ontario ÉTÉ 1992

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- 44 des 161 usines surveillées depuis 1988 (27 p. 100) étaient conformes aux normes établies pour une troisième année consécutive;

- In 1989:

  - 93 (or 55 per cent) of the 170 plants monitored did not meet their monthly average limits;

  - 53 of the 148 plants which had been assessed since 1987 failed to meet their monthly average limits three years in a row;

  - plants met their monthly limits 7,125 times (or 88 per cent) of the 8,139 times that they were monitored.

- In 1988:

  - 91 plants (or 54 per cent) of the 168 plants monitored in 1988 did not meet their monthly limits;

  - plants met their monthly limits 6,503 times (or 88 per cent) of the 7,388 times monitored.

- The 1990 report also contains results of two acute toxicity tests, one on rainbow trout and the other on *Daphnia magna*, which is a water flea. The two tests are required by MISA monitoring regulations for industrial dischargers or companies in the program. The tests check to see whether or not the trout and the water flea will live in the discharged effluent.

- There were 2,336 tests done on trout at 208 sites. Less than 50 per cent of the trout survived in undiluted effluent in 486 tests at 91 sites.

- Similarly, less than half of the *Daphnia magna* (flea) survived in 606 of the 2379 tests performed at 112 sites.

REMEDIAL ACTION:

- A review of the plants which did not comply in 1990 showed that:

  - 25 plants started major construction projects or equipment modification to bring the plants into compliance;

  - 37 plants implemented best management practices which improved their performance and efficiency and helped to bring the plants into compliance;

  - 19 plants with minor violations - where the effluent exceeded the guidelines marginally one or two times - took no action;

  - 57 usines (35 p. 100) n'étaient pas conformes aux normes établies depuis trois années consécutives;

  - les usines ont respecté leurs limites mensuelles un total de 7 196 fois, soit 90 p. 100 des 7 966 fois que des échantillons ont été prélevés.

- En 1989 :

  - 93 des 170 usines surveillées (55 p. 100) ne respectaient pas les limites mensuelles établies;

  - 53 des 148 usines surveillées depuis 1987 dépassaient leurs limites pour une troisième année consécutive;

  - les usines ont respecté leurs limites mensuelles un total de 7 125 fois, soit 88 p. 100 des 8 139 fois que des échantillons ont été prélevés;

- En 1988 :

  - 91 des 168 usines surveillées en 1988 (54 p. 100) ne respectaient pas les limites mensuelles établies;

  - les usines ont respecté leurs limites mensuelles un total de 6 503 fois, soit 88 p. 100 des 7 388 fois que des échantillons ont été prélevés;

- Le rapport de 1990 comprend aussi les résultats de deux essais de létalité aiguë effectués d'une part sur les truites arc-en-ciel et d'autre part sur les puces d'eau *Daphnia Magna*. Ces essais s'inscrivent dans le cadre des exigences de surveillance de la SMID pour les effluents des industries et des entreprises inscrites au programme. Le but des essais est de déterminer la létalité des effluents sur ces organismes.

- Un total de 2 336 essais ont été effectués à 208 endroits. Au cours de 486 essais effectués à 91 endroits, les effluents non dilués se sont révélés létaux pour plus de 50 p. 100 des truites.

- Par ailleurs, moins de la moitié des *Daphnia Magna* ont survécu dans les effluents non dilués de 606 des 2 379 essais effectués à 112 endroits.

MESURES CORRECTRICES

- L'évaluation des usines qui, en 1990, n'étaient pas conformes aux normes établies a révélé ce qui suit :

  - vingt-cinq usines ont entrepris d'importants projets de construction et de modernisation de

- nine plants closed in 1991 for economic reasons.

· In all, 62 out of 90 company plants have taken steps to come into compliance. The ministry is negotiating with the remainder.

ENFORCEMENT:

· Prosecution is not the only avenue open to the ministry for dealing with company plants that exceed their discharge limits. The ministry investigates each incident of non-compliance on a case-by-case basis.

· Whether charges are warranted or not, the ministry may issue a Control Order which requires the company to take specific remedial action before a given date. Remedial actions may range from improved maintenance procedures which may be taken immediately to designing and building new treatment facilities which may take several years.

· In 1990, the Investigations and Enforcement Branch of the Ministry of the Environment investigated 57 violations by 26 companies which had legal limits placed on their effluent.

- two companies were prosecuted and convicted;

- six charges are still pending;

- two investigations were concluded with no further legal action;

- 47 violations resulted in the companies taking measures to improve the way they treat and handle their effluent.

MISA PROGRAM

· The goal of the MISA program is the virtual elimination of persistent toxic contaminants to the province's waterways.

· The approximately 400 companies in nine industrial sectors monitored their effluent for a year. Monitoring reports have been published for the petroleum, pulp and paper, iron and steel and organic chemicals manufacturing sectors. Reports for the remaining sectors will be released in 1992.

· The data collected during the monitoring period is being used to develop legally enforceable regulations to limit the type and amount of waste discharged into waterways. Some of the regulations are expected to be released for public review this year.

l'équipement afin de se conformer aux normes établies;

- trente-sept usines ont mis en oeuvre de meilleures pratiques de gestion, ce qui a entraîné une amélioration de leur rendement et de leur efficacité tout en les rapprochant des normes établies;

- dix-neuf usines coupables d'infractions mineures, c'est-à-dire où les effluents dépassaient légèrement les limites établies à une ou deux reprises, n'ont entrepris aucune mesure correctrice;

- neuf usines ont fermé leurs portes pour des raisons financières.

· Au total, 62 des 90 usines ont entrepris des mesures dans le but de se conformer aux normes. Le Ministère négocie à l'heure actuelle des ententes avec les dirigeants des autres usines.

APPLICATION DES LOIS ENVIRONNEMENTALES

· Les poursuites devant les tribunaux ne constituent pas le seul moyen dont dispose le Ministère pour traiter avec les usines qui dépassent les limites de pollution établies. Chaque cas de non-conformité est examiné individuellement et les mesures appropriées sont prises selon la gravité de l'infraction.

· Qu'une inculpation soit justifiée ou non, le Ministère peut délivrer un arrêté d'intervention contraignant les dirigeants d'une usine à entreprendre des mesures correctrices dans un délai déterminé. Ces mesures correctrices peuvent exiger simplement qu'une usine adopte sans délais de nouvelles pratiques d'entretien ou même qu'elle entreprenne la construction de nouvelles installations, travaux pouvant s'échelonner sur plusieurs années.

· En 1990, la Direction des enquêtes et de l'application des lois du ministère de l'Environnement a mené des enquêtes sur 57 infractions commises par 26 entreprises auxquelles on avait imposé des limites quant au rejet d'effluents. Parmi celles-ci :

- deux entreprises ont été inculpées et condamnées;

- six inculpations sont en instance;

- deux enquêtes ont été menées sans qu'aucune inculpation ne soit portée;

· A total of 62 small hydro-electric generating stations and 65 pit and quarry companies were not included in the first monitoring phase. The monitoring results from a representative number of similar hydro-electric and pits and quarries companies will be used to set effluent limits for these industries.

· Once the MISA limits are in place, compliance will be assessed by a self-monitoring and ministry audit program to determine whether or not the companies are meeting the MISA effluent limits.

TO OBTAIN A COPY:

· The Report on the 1990 Industrial Direct Discharges in Ontario (PIBS 1957) is available through the Public Information Centre at the Ministry of the Environment, 135 St. Clair Ave., W., Toronto, Ont. M4V 1P5, (416) 323-4321 or 1-800-565-4923.

- 47 infractions ont été à l'origine de l'adoption de mesures correctrices par différentes entreprises.

LA STRATÉGIE MUNICIPALE ET INDUSTRIELLE DE DÉPOLLUTION (SMID)

· Le but de la Stratégie municipale et industrielle de dépollution (SMID) est la quasi-élimination du rejet de contaminants toxiques persistants dans les lacs et les cours d'eau de la province.

· Environ 400 entreprises dans neuf secteurs d'activité industrielle ont exercé une surveillance de leurs effluents pendant un an. Des rapports de surveillance ont été publiés par les secteurs des produits pétroliers, des pâtes et papiers, de la sidérurgie et de la fabrication de produits chimiques organiques. Les rapports des autres secteurs d'activité industrielle seront publiés en 1992.

· Les données recueillies pendant la période de surveillance servent à établir de nouvelles limites légales quant à la qualité des effluents déversés dans les lacs et les cours d'eau. On prévoit que certaines lignes directrices seront soumises à l'examen du public dans les mois qui suivent.

· La première phase de surveillance de la SMID ne tenait pas compte des effluents de 62 petites centrales hydroélectriques et de 65 carrières. Les résultats de la surveillance d'un nombre représentatif d'entreprises semblables serviront à établir les limites de toxicité des effluents de ces secteurs d'activité.

· Une fois que les limites de la SMID auront été établies, chaque entreprise sera responsable de la surveillance de la qualité de ses effluents. De plus, le Ministère fera des vérifications auprès de ces entreprises pour s'assurer de leur conformité.

RENSEIGNEMENTS SUPPLÉMENTAIRES :

· On peut se procurer des exemplaires du rapport, intitulé *Report on the 1990 Industrial Direct Discharges in Ontario* (PIBS 1957) en s'adressant au Centre d'information du ministère de l'Environnement au 135, avenue St. Clair ouest, Toronto (Ontario) M4V 1P5. Téléphone : (416) 323-4321 ou 1-800-565-4923.

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PIBS 2103B
08/92 2M

ENVIRONMENT INFORMATION - ENVIRONNEMENT

WINTER 1992 | Ontario Environment Environnement | HIVER 1992

ONTARIO'S ENVIRONMENTAL LEGISLATION

The Ontario Ministry of the Environment was established in 1972 to consolidate responsibility for all aspects of environmental protection, enhancement and restoration under one provincial government agency.

The consolidation involved two government agencies, the Department of the Environment and the Ontario Water Resources Commission, with the new ministry inheriting the operating legislation from each of its predecessors.

ENVIRONMENTAL PROTECTION ACT (EPA)

The general provisions of the EPA cover all types of pollution, forbidding the discharge of any contaminant to the natural environment in amounts, concentrations or levels exceeding those prescribed by regulation. A contaminant is defined as a solid, gas, liquid, odor, heat, sound, vibration, radiation or combination of any of these, resulting directly or indirectly from human activities, which may cause injury to humans, flora or fauna.

In addition to regulated limits for specific contaminants, the EPA prohibits any discharge that is likely to impair the natural environment, injure or damage plant or animal life, cause harm or discomfort to any person, affect the health or safety of any person or render any property, plant or animal life unfit for human use.

The EPA authorizes the ministry's designated provincial officers to enter and inspect properties in order to investigate potential sources of pollution. A recent amendment provides that anything produced to a provincial officer or in plain view during an

LA LÉGISLATION DE L'ENVIRONNEMENT ONTARIO

Le ministère de l'Environnement de l'Ontario a été créé en 1972 en vue de regrouper les diverses facettes de la protection, de l'amélioration et de la restauration de l'environnement en un seule organisme.

Deux services gouvernementaux, à savoir l'ancien ministère de l'Environnement et la Commission des ressources en eau de l'Ontario, furent ainsi fusionnés, le nouveau ministère héritant, par le fait même, des lois dont ses prédécesseurs avaient la charge.

LOI SUR LA PROTECTION DE L'ENVIRONNEMENT

La *Loi sur la protection de l'environnement* vise toutes les formes de pollution et interdit le rejet de contaminants dans l'environnement si leur quantité, leur concentration ou leur intensité excède celles prescrites par les règlements. On entend par contaminant les solides, les gaz, les liquides, les odeurs, la chaleur, les sons, les vibrations, les radiations ou une combinaison de ces éléments, directement ou indirectement attribuables aux activités humaines, lorsqu'ils peuvent avoir une conséquence préjudiciable sur l'être humain, la flore ou la faune.

En plus d'établir des seuils de tolérance pour des contaminants spécifiques, la *Loi sur la protection de l'environnement* interdit le rejet de toute substance susceptible de dégrader le milieu naturel, d'endommager la vie animale ou végétale, de causer des nuisances ou des malaises à une personne, d'affecter la santé ou la sécurité de qui que ce soit ou de rendre un bien ou une forme de vie animale ou végétale impropre à son utilisation par l'homme.

inspection may be seized if the officer reasonably believes that there has been a contravention of the acts of their regulations.

Pollution abatement equipment may be installed on a voluntary basis by the owner of a pollution source or the owner's abatement measures may be formalized by the submission, to the ministry, of a control program to prevent or reduce and control the emission of a contaminant. The EPA also authorizes a director of the ministry to issue control orders requiring specific abatement measures for the protection of the environment or human health or requiring the owner to take whatever measures are required to stop the emission of a contaminant, up to and including the suspension of plant operations.

Anyone proposing any project which would cause the emission of excessive contaminants to the environment is required to apply for and secure a certificate of approval and to install any required pollution control measures before operations can commence.

Various provisions of the EPA cover air pollution control, including automotive emissions, the control and certification of waste handling and disposal systems and sites, and the inspection and certification of private sewage systems by the ministry. Amendments made to this act provide legislative authority for municipal noise control bylaws.

The ministry took a significant step in protecting the environment when Part IX of the EPA came into force in 1985. Commonly known as the Spills Bill it requires spills of pollutants discharged into the environment to be reported and cleaned up promptly by the owner or person in control of the material when it was spilled. It establishes a liability on those who own or control the spilled material to compensate those who incur costs or suffer damages. The EPA also established the Environmental Compensation Corporation (ECC) which receives applications for compensation from parties who have suffered loss or damage due to a spill. The ECC does not replace the role of insurance companies, nor does it lessen the legal responsibilities of those involved in a spill. It does help where those sources of compensation are not available.

To complement the EPA, the ministry has established the Spills Action Centre (SAC). The centre receives notification of spills 24 hours per day, 365 days per year on a provincewide toll-free number. When a spill

La loi autorise les agents provinciaux désignés par le ministère, sous réserve de certaines garanties visant à protéger les droits individuels, à pénétrer sur une propriété et à l'inspection pour y déceler des sources de pollution éventuelles. Une récente modification à la loi stipule qu'un agent provincial peut saisir une chose produite ou une évidence devant lui au cours d'une inspection s'il a motifs raisonnables de croire que la loi ou les règlements ont été enfreints.

Le propriétaire d'une source de pollution peut installer de son propre gré un dispositif anti-pollution ou présenter officiellement au ministère un programme de mesures visant à éliminer les émissions ou à les réduire et les contrôler. La Loi autorise également un directeur du ministère à délivrer des arrêtés d'intervention et autres qui exigent l'adoption de mesures de dépollution précises pour protéger l'environnement ou la santé publique ou bien la suppression des émissions par le propriétaire, voire la suspension des activités de l'établissement.

Quiconque présente un projet en vertu duquel une quantité excessive de polluants serait libérée dans l'environnement est tenu de soumettre une demande de certificat d'autorisation et, après avoir obtenu ce dernier, de mettre en oeuvre les mesures de dépollution prescrites avant le début des activités.

Diverses dispositions de la Loi ont trait à la lutte contre la pollution atmosphérique, notamment les gaz d'échappement des véhicules automobiles, au contrôle et à la certification des systèmes et des lieux de manutention et d'élimination des déchets, de même qu'à l'inspection et à la certification par le ministère des systèmes privés d'évacuation des eaux usées (les fosses septiques et les éléments épurateurs, par exemple). La Loi autorise également les municipalités à promulguer des règlements en matière de lutte contre la pollution par le bruit.

L'entrée en vigueur de la Partie IX de la Loi, en 1985, a permis au ministère de faire un grand pas sur le plan de la protection de l'environnement. Connue sous le nom de *loi sur les déversements*, la Partie IX exige que tout déversement de polluants soit signalé et nettoyé sans délai par le propriétaire du matériel ou la personne qui en était responsable au moment de l'accident. Elle oblige également ces personnes à indemniser ceux qui ont dû engager des dépenses ou qui ont subi des dommages à la suite de l'incident. Elle ne stipule pas cependant qu'il est illégal de déverser un polluant; cela dépend des circonstances en cause et des autres dispositions de la Loi sur la protection de l'environnement ainsi que des autres

occurs, SAC is responsible for assessing the situation and determining what assistance the ministry can provide.

The EPA has a comprehensive system of penalties. The basic penalties are a maximum fine of $5,000 for a first offence and $10,000 for a subsequent offence. Where the defendant is a corporation, the penalties are five times greater. Where the offence involves actual discharge of a contaminant into the environment and actual or likely damage, the maximum penalty for a corporation doubles, and the individual polluter faces the added possibility of a jail term along with the fine.

When the offence involves hazardous waste or hauled liquid industrial waste, the individual faces a year in jail and a maximum fine of $5,000 on a first offence and $15,000 on a subsequent offence. For corporations, these numbers go up to $50,000 and $100,000. The maximum fine applies to offences concerning hazardous wastes and liquid industrial waste where environmental harm has actually taken place. An individual is subject to a maximum fine of $10,000 on a first conviction and $25,000 on each subsequent conviction. A corporation faces a maximum fine of $250,000 on a first conviction and $500,000 for subsequent convictions.

In addition to these penalties mentioned above, the court can order forfeiture of any profits made by breaking the law and can order cleanup and restoration of the environment.

The penalty structures for the Ontario Water Resources Act and the Pesticides Act are similar, except that there are no provisions dealing with hazardous or liquid waste under the Pesticides Act. However, minor offences are now ticketed. The maximum possible fine under the Provincial Offences Act is $300, with the average fine set much lower by the courts. Clearly, these tickets will not be used for more serious contraventions of the regulations and are not used for contraventions of the act itself.

Note: the Provincial Penalties Adjustment Act, 1989 (Bill 92) received Royal Assent on December 14, 1989, but has not yet been proclaimed in force. It will substantially raise many of the penalties mentioned above.

ONTARIO WATER RESOURCES ACT

This act gives Environment Ontario extensive powers to regulate water supply, sewage disposal and the

lois et règlements du ministère.

La Partie IX a donné lieu à la création de la Société d'indemnisation environnementale, qui dédommage les personnes ayant subi des pertes et des dommages par suite d'un déversement. Cette société ne remplace pas les compagnies d'assurance et n'allège pas les responsabilités des personnes responsables du déversement, elle ne sert que de solution de dernier recours dans les cas où les sources d'indemnisation habituelles ne donnent pas satisfaction ou ne sont pas accessibles.

En complément à la *Loi sur la protection de l'environnement*, le ministère a mis sur pied le Centre d'intervention en cas de déversement que l'on peut joindre 24 heures sur 24, à longueur d'année, grâce à une ligne sans frais. Quand survient un déversement, le centre évalue la situation et détermine dans quelle mesure le ministère ou tout autre organisme peut prêter secours.

La Partie V-A est venue s'ajouter à la Loi sur la protection de l'environnement en juin 1989. Elle fournit un cadre d'application pour la réglementation ou l'interdiction des substances qui appauvrissent la couche d'ozone, en particulier certains types de chlorofluorocarbones (CFC) et de halons qui menacent la couche d'ozone atmosphérique. Les premiers règlements sont entrés en vigueur le 1er juin 1989; ils visaient notamment à interdire l'emploi de certains pulvérisateurs à aérosols contenant des CFC utilisés à titre d'agents propulseurs ou de gonflants pour mousse d'emballage. Le ministère prépare actuellement une série d'autres règlements visant à interdire ou à réglementer les utilisations des CFC qui sont encore admises à mesure que des substituts acceptables sont mis au point.

La *Loi sur la protection de l'environnement* établit un ensemble de sanctions. La peine de base est une amende maximale de 5 000$ pour une première infraction et de 10 000$ pour une récidive. La somme de l'amende est quintuplée quand la faute incombe à une société. S'il y a vraiment eu déversement d'un polluant dans l'environnement et qu'il a entraîné des dommages réels ou probables, l'amende maximale est doublée dans le cas d'une société, et la personne responsable est passible d'emprisonnement.

Quand l'infraction met en cause des déchets dangereux ou des déchets industriels liquides transportés, le responsable peut être condamné à un an de prison et à une amende maximale de 5 000 $ dans un premier cas ou de 15 000 $ s'il s'agit d'une récidive. Quant aux sociétés, elles sont passibles

control of water pollution. It authorizes the ministry to supervise and examine all surface waters and ground waters in Ontario to determine the extent, nature and causes of contamination in these waters.

Under the Ontario Water Resources Act, any discharge into a body of water, on its shore or in any place that may impair the quality of the water, is an offence. It is also an offence to make any discharge that directly or indirectly causes injury to a person, animal or bird through the use or consumption of any plant, fish or other living matter in the water.

Certificates of approval and installation of any required pollution controls are necessary for any persons, industries or municipalities drawing from a body of water or discharging waste into it.

The ministry can construct and operate water waste treatment facilities, or it can require an industry or municipality to construct and operate approved facilities.

Water quality criteria have been established as acceptable standards for the various uses made of water.

ENVIRONMENTAL ASSESSMENT ACT (EAA)

This act provides for the assessment of any proposed major undertaking — governmental, municipal or private — at the very earliest stage so that it may be altered or even cancelled if it is found to be environmentally unacceptable. The act also provides for full public participation in the decision-making process. It is being implemented in stages, applying first to major provincial undertakings. Specific private projects which involve significant environmental effects may be designated for assessment.

Under the EAA, any proponent of an undertaking submits to the ministry an environmental assessment on the proposal. All interested parties are given an opportunity to examine this document and may request that a public hearing be called by the Environmental Assessment Board.

The Minister of the Environment, at his discretion, may deny any such request if he considers it to be frivolous, vexatious or that hearings would cause unnecessary delay to an environmentally acceptable undertaking.

The Environmental Assessment Board has decision-making powers when public hearings are held. The minister and cabinet serve as final arbiters of the

d'amendes de 50 000 $ et 100 000 $ respectivement. Le maximum est automatiquement imposé si les déchets dangereux ou les déchets industriels liquides ont détérioré l'environnement. Une personne s'expose à un an de prison et à une amende maximale de 10 000 $ pour une première condamnation et de 25 000 $ pour chaque condamnation ultérieure, comparativement à 250 000 $ et 500 000 $ respectivement dans le cas d'une société.

Outre les peines susmentionnées, le tribunal peut exiger la cession de tout profit réalisé du fait de l'infraction et ordonner le nettoyage des lieux et la restauration de l'environnement.

Les peines prévues lar la *Loi sur les ressources en eau de l'Ontario* et la *Loi sur les pesticides* sont semblables, sauf que la seconde ne renferme aucune disposition pour les déchets dangereux ou les déchets industriels liquides. Les délits mineurs feront désormais l'objet de contraventions, le maximum autorisé en vertu de la *Loi sur les infractions provinciales* étant de 300 $; l'amende fixée par les tribunaux est généralement beaucoup moindre. De toute évidence, on n'y recourra plus pour les délits graves, ni pour condamner ceux qui contreviennent au lois proprement dites.

[NOTA : La *Loi de 1989 sur le rajustement de peines provinciales* (Projet de loi 92) a reçu la sanction royale de 4 décembre 1989, mais n'a toujours pas force de loi. Elle prescrit une nette augmentation des peines mentionnées plus haut.]

LOI SUR LES RESSOURCES EN EAU DE L'ONTARIO

Loi sur les ressources en eau de l'Ontario confère à l'Environnement Ontario de vastes pouvoirs de réglementation en matière d'approvisionnement en eau, d'élimination des eaux usées et de dépollution des eaux. Elle autorise le ministère à étudier et à surveiller les eaux de surface et les eaux souterraines de la province pour déterminer l'étendue, la nature et l'origine de la contamination.

En vertu de cette loi, tout rejet d'un polluant dans des eaux, sur leur berge ou à un endroit quelconque où la qualité de l'eau peut s'en trouver dégradée, constitue une infraction. Le rejet d'un polluant qui, directement ou indirectement, nuit à une personne, à un animal ou à un oiseau par suite de l'utilisation ou de la consommation d'une plante, d'un poisson ou d'une autre matière vivante qui se trouve dans l'eau enfreint

board's decisions.

PESTICIDES ACT

This legislation restricts the storage, distribution, sale and use of pesticides. The ministry examines and licenses professional exterminators and maintains a classification system to ensure that hazardous chemical pesticides are not handled or used by unqualified persons.

CONSOLIDATED HEARINGS ACT, 1981

When the Environmental Assessment Act was first applied to significant municipal projects, one of the main concerns raised by municipalities was the planning and approval processes required, especially under the Planning Act and the Ontario Municipal Board Act. The Consolidated Hearings Act provides a streamlined approval process for municipal, private and provincial projects or proposed activities which may otherwise require hearings by more than one tribunal. Hearings under this act are conducted by one or more members of the Ontario Municipal Board, the Environmental Assessment Board or both as chosen by the chairpersons of the two boards. The streamlining of hearings under the Consolidated Hearings Act is aimed at avoiding the possibility of repetitive, expensive, complex and time-consuming approval procedures.

ONTARIO WASTE MANAGEMENT CORPORATION ACT, 1981

This act established the Ontario Waste Management Corporation with powers to provide, develop and manage facilities for the treatment and disposal of liquid and hazardous waste generated by industry. The powers of the corporation include a mandate to encourage recycling and reduction of these wastes at their industrial sources.

ENVIRONMENT STATUTE LAW AMENDMENT ACT

The newest amendments to the Environmental Protection Act, the Ontario Water Resources Act and the Pesticides Act are contained in the Environment Statute Law Amendment Act, which came into force on June 29, 1988. This act clarifies the ministry's enforcement and inspection powers and provides greater precision and protection of individual rights. In addition, the act provides that anything produced to a provincial officer or in plain view during an inspection may be seized if the officer reasonably believes that there has been a contravention of the acts or their

également la Loi.

Toute personne, industrie ou municipalité qui désire aménager une usine de traitement de l'eau ou une station d'épuration des eaux d'égout, y compris une usine de traitement des eaux usées industrielles, doit obtenir au préalable un certificat d'autorisation et installer les dispositifs anti-pollution nécessaires.

Le ministère peut construire et exploiter des installations de traitement de l'eau ou d'épuration des eaux d'égout ou bien participer au financement d'ouvrages municipaux. Il peut aussi exiger d'une industrie ou d'une municipalité qu'elle construise et exploite les installations approuvées nécessaires.

Enfin, le ministère a établi des critères de qualité de l'eau pour les divers usages de l'eau.

LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES

La *Loi sur les évaluations environnementales* prévoit l'évaluation, dès les premiers stades, de tout projet d'envergure, soit-il gouvernemental, municipal ou privé, et en permet ainsi sa modification, voire son annulation s'il est jugé inacceptable sur le plan environnemental. Cette loi tient compte des aspects social, économique et culturel du milieu, ainsi que de l'environnement naturel visé par la *Loi sur la protection de l'environnement*. Elle prévoit également la pleine participation du public à la prise des décisions. La Loi vise certaines catégories de projets provinciaux et municipaux. Les projets privés d'envergure y sont assujettis **uniquement** s'ils sont spécifiquement désignés par voie de règlement.

Aux termes de la *Loi sur les évaluations environnementales*, le promoteur doit présenter une évaluation de son projet au ministère, qui coordonne ensuite la préparation d'un examen. Les parties intéressées ont l'occasion d'étudier les documents et de demander qu'une audience publique soit tenue par la Commission des évaluations environnementales.

Le ministre de l'Environnement peut, à sa discrétion, refuser la demande s'il considère qu'elle est frivole ou vexatoire ou que la tenue d'une audience retardera inutilement la réalisation d'un projet acceptable du point de vue de l'environnement.

En cas d'audience, la Commission des évaluations environnementales jouit de pleins pouvoirs décisionnels, le ministre et le Conseil des ministres demeurant néanmoins les arbitres ultimes des

regulations. Finally, other amendments ensure greater fairness in the hearing and appeal procedures.

décisions prises par la commission.

LOI SUR LES PESTICIDES

La *Loi sur les pesticides* régit le stockage, la distribution, la vente et l'utilisation des pesticides. Le ministère fait subir un examen et délivre leur permis à ceux qui souhaitent devenir destructeurs professionnels; il maintient également un système de classification dans le but d'éviter l'emploi ou la manutention de produits chimiques dangereux par des personnes non qualifiées.

LOI DE 1981 SUR LA JONCTION DES AUDIENCES

Lorsque la *Loi sur les évaluations environnementales* a été étendue aux grands projets municipaux, l'un des principaux points soulevés était le processus de planification et d'approbation qu'exigeraient notamment la Loi sur l'aménagement du territoire et la *Loi sur la Commission des affaires municipales de l'Ontario*. La *Loi sur la jonction des audiences* simplifie le processus d'approbation des projets municipaux, privés et provinciaux ou des activités qui, en d'autres temps, demanderaient la tenue d'une audience devant plusieurs tribunaux. Les audiences tenues aux termes de cette loi exigent le concours d'un ou des plusieurs membres de la Commission des affaires municipales, de la Commission des évaluations environnementales ou des deux, selon la décision des présidents des deux commissions. La simplification des audiences élimine les risques de procédures répétitives, coûteuses, complexes ou trop longues.

LOI DE 1981 SUR LA SOCIÉTÉ ONTARIENNE DE GESTION DES DÉCHETS

Cette loi crée la Société ontarienne de gestion des déchets et lui permet d'aménager et de gérer des installations de traitement et d'élimination des déchets liquides et des déchets dangereux d'origine industrielle. Entre autres responsabilités, la Société doit encourager la réduction des déchets à la source et leur recyclage.

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IMPRIMÉ SUR DU PAPIER RECYCLÉ

PIBS 585b
01/92-10M

ENVIRONMENT INFORMATION - ENVIRONNEMENT

WINTER 1992

Environment
Environnement

SOLID WASTE MANAGEMENT: A GLOSSARY OF TERMS

If you want to help protect the environment by reducing waste and to become more knowledgeable about waste issues, you will want to understand the language of waste management. Some of the words may at first appear to have no connection with solid waste, they are included because they relate to materials or processes which do play a role in waste issues. Other sources of information will have to be consulted if technical or legal details are required. Some commonly used abbreviations are found at the end.

Absorption

The taking in of one or more substances by another, such as soil absorbing rain water or leachate.

Acidic Substance

Anything which has an abundance of hydrogen ions; has a value less than 7.0 on the pH scale; often very corrosive. See *pH Scale; Corrosive Substance.*

Adsorption

The adherence, or attachment, of one or more substances onto the surface of another.

Aerobic Conditions

A situation in which there is an adequate supply of oxygen available (e.g. a compost heap that is mixed, or turned over, regularly)

Alkaline Substance

Anything which has a value greater than 7.0 on the pH scale; often very corrosive. See *pH Scale; Corrosive Substance.*

Anaerobic Conditions

A situation in which there is an inadequate supply of oxygen available (e.g. within the well-compacted waste at a landfill site)

Aqueous Solution

A solution of one or more substances dissolved in water.

Aseptic Condition

Free of disease-causing organisms.

Bacteria

Microscopic organisms, some of which cause disease and some of which cause the decay of plant and animal material.

Baling

The mechanical compression of waste or recyclable materials into rectangular bales. Bales are easier to handle, store and transport than loose waste.

Bioaccumulation

The absorption and storage of a material within an organism which is not able to break the material down for elimination. The persistent materials often reside in the organism's fatty tissues, and the amount accumulates, or builds up, throughout the life of the individual organism.

Biological Magnification

The apparent multiplying of persistent chemicals at every step of a food chain. When any organism eats another, it instantly obtains all the persistent chemicals which have bioaccumulated in the food source.

Biodegradable Material

Items, or chemicals, capable of being broken down, or decomposed, by natural biological processes, usually involving oxygen, moisture and microorganisms such as bacteria. It is a mistake to assume that the processes are quick, produce harmless products and are necessarily good for the environment. Note that biodegradable plastics have been synthesized using starch molecules. It is these starch molecules that the microorganisms digest, leaving the actual plastic molecules behind as 'plastic dust'.

Biodegradation

Breaking down, decomposing, decaying or rotting, by natural biological processes. The processes may take a very long time. If the processes occur in bodies of water, they use up valuable oxygen which is needed by the aquatic organisms and often release nutrients which increase the rate of eutrophication.

Biogas

See *Methane*.

Bleaching

The whitening of something, such as paper or fabric, often using chemicals. When chlorine is used as the bleaching agent, the resulting effluent is toxic.

Blister Package

Packaging which surrounds a product with a transparent plastic bubble mounted onto a cardboard or plastic board. Such packages are said to make the storage and display of the product easier and help reduce shoplifting, but they do not easily lend themselves to recycling.

Blue Box

A blue plastic box used by residents of many municipalities and rural areas to collect and store recyclable items and to carry these items to the curbside /roadside for collection.

Blue Box Materials

The usual materials which are accepted in a community's blue box program (e.g. cans, glass bottles and jars, newspapers). Check your local area because many community programs now also include some types of plastic. It is very important to put only appropriate materials into your blue box. Putting in the wrong items require extra sorting procedures while others render the whole load of materials unsuitable for recycling. The kinds of materials collected in a Blue Box programs are constantly expanding. See *Recyclable Material.*

Bottom Ash

The residue which remains at the bottom of an incinerator after waste is burned. It is often toxic and creates disposal problems. See *Fly Ash; Incinerator.*

Boxboard

Stiff paper packaging, often called cardboard, used for cereal, tissue and detergent boxes; not to be confused with corrugated cardboard. Most boxboard has always been made using a certain amount of used paper, such as newspapers. See *Corrugated Cardboard.*

Carcinogen

A substance or agent (e.g. radioactivity) which causes cancer.

Certificate of Approval (C of A)

A legal document which is required for the operation of any waste management facility under the *Environmental Protection Act.*

Closed-Loop Recycling

Converting used material into material the same as, or similar to, the original (e.g. used newspapers into new newsprint and glass jars into glass bottles). Also known as primary

recycling, this type of recycling is preferable because it is the most energy efficient.

Co-Mingling

The intentional segregation of recyclable materials from general waste but allowing all recycables to be mixed together during collection, requiring further sorting at another location. Co-mingling may save money during collection but the sorting is imperfect and loads of recyclable materials may be contaminated. As a result, the contaminated load of recyclable materials may be unacceptable for a re-processing.

Composite Package

Any package consisting of more than one material; the more materials involved, the more difficult to recycle the package.

Compost

Partially decomposed organic matter which can be added to soil as a source of nutrients and a conditioner. Compost can be produced from kitchen wastes, such as vegetable peelings, and yard waste, such a grass clippings and leaves.

Compostable Material

Anything which is capable of being composted, or biodegraded. All organic materials will biodegrade, but some should be avoided in backyard compost containers. For details, refer to general booklets on this topic or specific instructions which come with commercially available containers.

Conserver Society

A society whose responsible citizens make concerted efforts to reduce consumption of energy and material resources. Conserver citizens also alter their habits in order to reduce the production of waste and other materials which harm the environment.

Consumer Society

A society whose citizens meet their own ever-increasing demands with little regard for the amount of energy or material resources they use up and/or how the environment is degraded

by the disposal of their wastes. High consumer demand became a strategic economic goal in many Western countries after World War II and was artifically stimulated through advertising.

Contaminant

A substance, or form of energy, resulting from human activity, which causes an adverse effect on the natural environment, or impairs human use of the environment. Even a naturally-occurring substance can become a 'contaminant' if a human activity causes it to be in an amount or location where it is not wanted (e.g. phosphates, found in many soaps, are essential plant nutrients but cause harm to aquatic ecosystems when their concentration increases quickly and/or over the normal amount).

Contaminant Pathways

Simple or complex routes followed by contaminants as they move through various ecosystems. Contaminants may undergo various physical and chemical processes, but never really disappear. See also *Bioaccumulation; Biological Magnification; and Ecosystem.*

Corrosive Substance

Anything capable of gradually wearing away other materials through chemical reactions. Very acidic or alkaline substances are corrosive and usually harmful to living tissue. Corrosive substances are considered hazardous under the law and must be disposed of carefully.

Corrugated Cardboard

Stiff paper packaging made of two flat layers on the outside and a ridged layer in the middle. Not to be confused with boxboard. Corrugated cardboard is commonly used to make boxes for many products. Old corrugated cardboard is easily recycled into new corrugated cardboard unless coated with wax, heavy paint or contaminated with food waste. See *Boxboard.*

Cradle-To-Grave Management

An approach to managing wastes, usually industrial and hazardous wastes, from the point of generation (the "cradle") to the final point of treatment and disposal (the "grave"). In Ontario, the cradle-to-grave management of industrial and hazardous wastes is enforced by

means of a waste generator registration process and a manifest system for the transportation of hazardous waste to a certified treatment and disposal facility. See *Polluter Pays*.

Cullet

Glass that has been intentionally crushed prior to being mixed with other raw materials to make new glass products. The crushing may be done by munipalities or by the companies that actually reprocess the glass.

Curbside/Roadside Recycling

A recycling program in which people separate recyclable materials from general waste and place them at the curbside/roadside for collection.

Decomposition

See *Biodegradation*.

Decomposers

Microscopic organisms (e.g. bacteria and fungi) or small animals (e.g. worms and insect larvae) which digest or eat organic materials and produce a nutrient-rich material suitable for compost. See *Ecosystem*.

De-Inking

A chemical process which removes ink from recyclable paper. Often harmful wastes are produced. Recycling paper materials does not always include de-inking.

Disposable Product

Something designed to be thrown away after one, or just a few, uses.

Domestic Waste

See *Residential Waste*.

Drink(ing) Boxes

Aseptic containers designed for convenient transportation and long-term storage of liquids such as fruit juices. They are an example of a composite package, consisting of paper, plastic and metal foil and are not suitable for closed-loop recycling. Some plastic recycling processors will accept a certain limited percentage of these containers with other mixed plastics.

Dump (Site) (noun)

Location where garbage is "dumped"; usually a site not approved to take garbage in the first place. Not to be confused with an approved and properly managed landfill site.

Dump (verb)

To discard waste materials. Often used to describe the careless disposal of garbage.

Ecosystem

Any given area of the earth where living organisms (the "biotic components") interact with nonliving things (the "abiotic components") in a cyclic exchange of matter and energy (e.g. oxygen, nitrogen, water, carbon dioxide, etc). The basic unit of ecology. Ecosystems range in size from very small to very large. Examples include a pond, forest, lake, desert; etc. An ecosystem consists of four types of organisms: plants, herbivores, carnivores, omnivores, and decomposers. Depending on how an ecosystem is defined, many organisms can be part of more than one ecoystem. Nutrient cycles and contaminant pathways may also involve more than one ecosystem.

Effluent

Liquid waste, often from industrial processes. In many cases, effluent contains harmful contaminants which must be removed by a treatment process before it can be released into the environment.

Emissions

Waste, often from industrial processes, in the form of gases or fine particulates released into the atmosphere. In many cases, air emissions into the environment contain harmful contaminants which must be removed to acceptable concentration levels.

Energy From Waste (EFW)

The concept of burning waste in an incinerator and using the released energy to make steam or to generate electricity which could be used in a variety of ways (e.g. to heat buildings). See *Incinerator*.

Environmental Choice

A label allowed by the federal government on particular items or brands which meet specific criteria; indicates that these items or brands are considered less harmful for the environment than others.

Environmental Assessment (EA)

A detailed environmental study of a proposed project. The study includes an assessment of the need for the project, various alternatives to the project, potential social and environmental impacts, methods to reduce the potential for any negative effects, methods to remediate any problems which do occur, and monitoring techniques and frequency.

Environmentally Friendly

A term which many people think means 'good for the environment'. Since the manufacture, use and disposal of most products are not good for the environment, this term is misleading and often used as a marketing tool. If this label is used honestly, it may mean that the product or package causes less harm than others based on current information.

Environmentally Responsible

A term used to describe activities carried out, or choices made, when the people making the decisions have taken into account the potential impact of those activities, or choices, on the environment. Note that it is not the products, but the decisions, which are environmentally responsible (e.g. the choices to buy bulk food items and to carry reusable shopping bags back to the stores).

Eutrophication

The gradual natural aging of a body of water. Eutrophication involves a series of related physical, chemical and biological changes in the aquatic ecosystem. It becomes a problem when its rate is increased because of human activity (e.g. addition of excess nutrients from

fertilizer run-off, feedlot operations and inadequate sewage treatment).

Fertilizer

Material, natural or synthetic, used to add nutrients to soil. Most chemical fertilizers contain a mixture of nitrogen, phosphorus, and potassium.

Fine Paper

Good quality paper such as that used for photocopiers, computers, legal documents and writing; has long cellulose fibres. Can easily be recycled.

Fly Ash

Non-combustible particulates which are often emitted by incinerators but which can be removed by various pollution control devices. When removed, there is still a disposal problem. See *Bottom Ash; Incinerator.*

Garbage

A used material people no longer want and for which they can find no further uses. Also called: rubbish, refuse, residual (waste), and trash. Whatever its called, garbage is something we classify as such by putting in a container for collection and disposal. Unfortunately, much of what we call garbage often contains many items which are reusable or recyclable. See *Municipal Solid Waste.*

Garbage Compactor

Special equipment for reducing the volume of garbage using pressure. Large models are used by communities to reduce the volume of garbage before burying it in a landfill. Small models used in homes may make people feel there is no need to recycle or choose items with less packaging.

Garbage-Free Lunches

Lunches using reusable containers and utensils. Leftover food from a lunch goes into a composter. As a result, nothing becomes classified as "garbage."

Garburetor

Small electrical apparatus, usually attached to the kitchen sink, for grinding organic wastes before flushing them down the drain. Garburetors waste electricity and water and may put a strain on the community's sewage treament plant or family's septic system. Organic wastes should be composted instead.

Groundwater

Water which exists in underground passageways in rocks and which flows in response to gravity; often the source of water for communities. See *Surface Water*.

Hazardous Materials

Things which are potentially harmful to living organisms because they are corrosive, inflammable, reactive or toxic. These items are not usually included with municipal solid waste.

Heavy Metals

A group of metals including aluminum, zinc, chromium, nickel, copper, tin, silver, antimony, cadmium, arsenic, lead, mercury, iron and cobalt. These materials tend to bioaccumulate and also follow contaminant pathways through an ecosystem's food web. Heavy metals are often present in the bottom ash of incinerators and the leachate from landfill sites.

Humus

Nutrient-rich material resulting from the natural decay of organic material in the soil; similar to compost.

Ignitable Substance

Anything which is easily set on fire. Such materials are considered hazardous and must be disposed of carefully. Same as flammable and inflammable; opposite of non-inflammable.

Incinerator

Facility for the burning of material, often garbage. Reduction in the volume of the material varies with the material being burned. Incinerators produce a residue, or bottom ash, which presents a disposal problem, and various gases and particulates, or fly ash, which should not be released into the atmosphere. See *Energy from Waste.*

Inorganic Material

Material which is not derived from plants or animals; i.e. does not contain carbon.

Impermeable Material

Substance which is able to prevent the passage, or movement, of materials through it. Impermeable is a relative term. Nothing is completely impermeable forever. Clay is used to line landfill sites because it is considered impermeable to leachate. See *Permeable; Semi-Permeable.*

Industrial, Commercial and Institutional (IC&I) Waste

Solid waste generated by industries and businesses of all types, including shopping stores, restaurants, and offices; and institutional types of establishments, such as schools, hospitals, government offices, and universities. IC&I waste makes up about 60 per cent of Ontario's total municipal solid waste stream. See *Municipal Solid Waste; Residential Waste*;

Landfill Site

An area of land used for the burial of wastes under controlled conditions. Often called a "sanitary landfill site." Landfilling involves the compaction of waste in sections, called "cells." The cells of waste are covered with soil at regular intervals. A properly designed landfill site includes plans for, site preparation, leachate and biogas control, final capping, site rehabilitation, final use, and perpetual monitoring.

Leachate

The liquid which results when rain or melting snow percolates through a material and carries with it dissolved materials picked up as it moves. Depending on the location, leachate may contain hazardous materials which could contaminate groundwater or surface water. Leachate has more heavy metals if the rain or snow is acidic.

Life Cycle Analysis

A way of determining the total amount resource and energy used and waste generated by a particular product at all stages of its development: from the resources extracted to make it, through to its manufacture in a factory, its sale in a store, its use by a consumer, the materials extracted from it to make new products, and its final disposal. Lifecycle analysis is still a relatively new science. It helps to compare the relative environmental impact of two or more types of products and packaging.

Litter

Large or small quantities of unwanted waste carelessly left lying around. Anti-litter campaigns do make our streets and parks look better but do not contribute to an actual reduction of solid waste going to disposal.

Low-Grade Paper

Paper which contains short cellulose fibres, has been chemically treated or had a special coating applied (e.g. newsprint, fax paper, boxboard and magazines); often of less value for recycling. See *Fine Paper*.

Material Recovery Facility (MRF)

A facility where specified materials are intentionally removed from mixed waste or where co-mingled recyclables are sorted into distinct categories.

Methane

A naturally-occurring gas produced when organic material biodegrades without the presence of sufficient oxygen. It is often mixed with other gases. Because methane is smelly, flammable and can migrate through soil, it can cause problems at landfill sites or in the surrounding area. It can be collected and used for the generation of heat and elecricity.

Microorganisms

Living things which can only be seen with the aid of a microscope or magnifying glass (e.g. bacteria).

Mitigation

Techniques for preventing, avoiding or reducing the impact of an environmental problem, such as water pollution caused by the movement of leachate from a landfill site. See *Remediation*

Mobius Loop

Originally a mathematical symbol. A modified Mobius loop has been adopted as a symbol for recycling because it conveys the infinite use and reuse of materials. Its three arrows represent the three states of matter which can be recycled: solids, liquids and gases. The symbol is used by government agencies, oganizations and businesses. By convention, two types of Mobius loop symbols are often used to mean either something is "recyclable" or that it "contains recycled materials."

This symbol means that a product or packaging is potentially recyclable. However, use of this symbol may be misleading. A used material is recyclable if it is accepted by a community's recycling program. If it is not, then it is not really recyclable in that particular community.

This symbol means that a product or packaging contains recycled materials. This symbol has also been much abused. Properly used, the symbol should be accompanied by information indicating the percentage of recycled content and whether it is pre-consumer waste or post-consumer waste that has been recycled. See also *Recyclable Material; Post-Commercial Waste; and Post-Consumer Waste.*

Monitoring

The detection by various means of any existing or potential environmental problems created by a waste site, usually over a long period of time. In landfills, for example, perpetual monitoring is necessary to be sure that the gas collection system is functioning properly and the liner is not leaking.

Municipal Solid Waste (MSW)

More commonly referred to as garbage, this waste material is handled by municipal collection and/or disposal services. It includes two main types of solid waste: residential, or domestic, waste and industrial, commercial and institutional waste. Municipal solid waste does not include hazardous and liquid industrial wastes. Also known as garbage, refuse, rubbish and trash. Different municipalities make legal distinctions among these terms, but they are all forms of municipal solid waste. See ***Industrial, Commercial and Institutation Waste; Residential Waste.***

Mutagen

A substance or agent (e.g. radioactivity) which causes genetic mutations.

Mutation

An inheritable alteration of the genes or chromosomes of an organism; may, or may not, cause adverse effects.

Non-Renewable Resources

Materials that cannot be replaced by nature once they have been used (e.g. coal, oil and natural gas). Metals are also non-renewable, but these can be recycled.

Not-In-My-Backyard (NIMBY)

A label often given to people who oppose the siting of waste disposal facility in their local communities. The concept of NIMBY has been much abused to include people with legitimate concerns about the environmental impact of a waste disposal facility.

Organic Material

Substances originating from living things and containing carbon (e.g. potatoes, meat, oil and plastic).

Orphan Site

Waste site which has been abandoned by its owners, and who cannot be found, or who refuse

to pay for their cleanup. Usually the cost of cleaning up an orphan site is assumed by government. See *Polluter Pays*.

Over-Packaging

Unnecessary extra layers of packaging. See *Packaging*.

pH Scale

Used to measure of the acidity or alkalinity of a material. The scale ranges from 0 (very acidic) to 14 (very alkaline). Each unit on the scale represents a factor of 10 because the scale is logarithmic (i.e. pH=4 is 10 times more acidic than pH=5 and pH=3 is 100 times more acidic than pH=5). Something with a pH=7 is neutral (neither acidic nor alkaline). For example, lemon juice is acidic, while baking soda is alkaline.

Packaging

The wrapping, container or packing material used to enclose a product. For every product, there is a list of reasons why packaging is considered to be required, ranging from protecting breakable items to providing an advertising vehicle. In some cases, there are legal packaging requirements (e.g. for making the item tamper-proof or providing ingredient lists or instructions in both official languages). Some reasons for packaging are considered more valid than others. Each situation should be judged individually. Although safety is a critical factor, the effects on the environment of both production and disposal of the package must also be considered.

Particulates

Finely divided solid or liquid particles, often included in emissions from industrial stacks.

Pathogen

Organism capable of causing a disease.

Percolation

The slow movement of a gas or liquid through a porous material, such as methane or rain through soil.

Permeable Material

A porous substance which allows the passage, or movement, of materials through it (e.g. sandy soil)

Photodegradable Material

Material which is capable of being broken down in the presence of ultraviolet (UV) radiation from the sun or artificial sources. Most plastics are photodegradable and require the addition of UV inhibitors if they are to be used outdoors (e.g. road signs).

Planned Obsolescence

The practice of designing products to wear out, break or become unfashionable so that replacement items or parts have to be purchased.

Plastics

A very large number of different, synthetic, organic compounds, usually made from products of the oil/petroleum industry. Different plastics have a great variety of properties and, thus, have many kinds of applications. Because there are so many kinds of plastics, it is often difficult to include them in community recycling programs.

Pollutant

See *Contaminant.*

Pollution

The release of contaminants into the environment. Pollution abatement is the removal of contaminants from emissions or effluent before they are released into the environment. Even better than pollution abatement is pollution prevention which involves changing industrial processes/activities to ensure that they do not create contaminants in the first place.

Polluter Pays

When applied to waste management: The idea that the person or persons responsible for generating wastes are responsible for bearing the costs of their management; and equally,

they are responsible for bearing the cost of cleaning up the environment. See *Cradel-to-Grave Management; Orphan Sites; Product Stewardship; True-Cost Accounting; Waste Generator.*

Polychlorinaed Biphenyls (PCBs)

A group of very stable organic compounds. PCBs had a variety of uses, mostly as electrical insulating fluids, until the mid-1970s, when they were banned for use in Canada. PCBs have been found in human tissues, rainwater, and many species of birds and fish. They have a tendency to collect in fatty tissue, degrade gradually, and to accumulate in the food chain (bioaccumulation). PCBs have been associated with various reproductive disorders in birds. In Ontario, anything containing PCBs is considered to be a hazardous material.

Polycyclic Aromatic Hydrocarbons (PAHs)

A group of compounds containing two or more aromatic (benzene) rings. A number of PAH compounds are known to be carcinogenic.

Polyethylene Terephthalate (PET)

A lightweight, strong, transparent plastic; used to make large carbonated, soft drink bottles.

Polystyrene (PS)

A plastic used to make clothes hangers, rulers and various containers. Polystyrene can be foamed to make drinking cups, plates, fast food containers and pellets or moulded for packing breakable materials. Originally made using CFCs and HCFCs, foamed polystyrene is now made using pentane, carbon dioxide or other gases as the foaming agent. *Styrofoam* is the commonly-used brand name of a blue-coloured foamed polystyrene rigid insulation.

Post-Commercial Waste

Materials remaining at the end of any manufacturing process which are returned to that process to make more products (e.g. trimmings and cuttings at a pulp and paper mill).

Post-Consumer Waste

Materials previously used by consumers at various locations, such as homes, offices, stores

and institutions, and collected for recycling (e.g. cardboard boxes, photocopies, old notebooks, glass bottles, cans).

Potable Water

Water which is suitable for drinking by humans and for cooking. Sources include groundwater aquifers and lakes and rivers. Potable water supplies can be contaminated by wastes improperly managed or from leachate leaking from landfill sites. See *Leachate*.

Pre-Consumer Waste

See *Post-Commercial Waste*.

Primary Recycling

See *Closed-Loop Recycling*.

Product Stewardship

An approach to waste management which recognizes the responsibility of a product or packaging manufacturer to control/monitor the manufacture, shipment, storage, use and final disposal of any product. See *Polluter Pays*.

Pulp

Soft, moist material resulting when wood is processed to make paper; consists mainly of cellulose fibres

3Rs of Waste Management

Reduce, reuse and recycle - in that order - before disposal! A major goal of municipal waste management is to keep materials out of the waste disposal stream. The 3Rs form a hierarchy of actions to achieve that goal:

- First, encourage people to reduce at source the amount of products or packaging purchased, consumed or used;
- Second, encourage people to buy reusable products or packaging and to reuse the

products or packaging as often and as much as possible; and then,

- Third, encourage people to participate in recycling programs.

The remaining material after the 3Rs are considered "residual waste." Note that it is wasteful to recycle a refillable and re-usable container.

Reclaim

To recover, or regain possession of, something in order to use it again.

Recyclable Material

A material which can be recycled. Not to be confused with 'reusable'. Technically, most materials can be recycled; however there are not necessarily programs set up to separate, collect and process all recyclable materials. The term 'recyclable' is relatively meaningless unless a program exists to collect, reprocess and market the end-product. See *Mobius Loop*.

Recycling

Physically, chemically or biologically reprocessing something in order to use the material to make a new product. A recycling program involves much more than just the actual reprocessing. It involves also the continuous separation, collection and/or cleaning of the recyclable materials and the maintenance of stable markets for the recyclable materials and useful final end-products. See *Closed-Loop Recycling and Secondary Recycling*.

Recycled Content

The percentage of the product or package which is made of recycled materials. See Mobius Loop; Post-Commercial waste; and Post-Consumer Waste.

Recycling Depot

A facility for the temporary storage of recyclable materials. In some areas, depots are used as drop-off locations by the public. In other areas, they are used by municipalities to store materials collected by trucks.

Recycling Plant

Facility to which recyclable materials are taken to be reprocessed.

Reduction

The decrease in the quanity of waste produced through modified consumer practices and industrial production changes to generate fewer useless by-products. See *3Rs of Waste Management*.

Refillable Container

A container which can be cleaned and filled several times after being used with the same or similar product (e.g. carbonated soft drink and Ontario beer bottles). Usually the refilling is done by the companies making the products.

Refuse-Derived Fuel (RDF)

Fuel made from processed garbage; often pelletized.

Refuse-Fired Steam Plant

Facility which generates steam using the energy released by the incineration of garbage.

Reject

To refuse to buy or accept a product or type of packaging because it is wasteful. Often referred to as an activity within reduction - the first "R" of the 3Rs of waste management.

Remediation

Taking corrective measures at a site causing environmental problems.

Renewable Resources

Resources which can be replenished by nature after being extracted or used by humans. Trees are often called a renewable resource; so is water, fish and wild game. In reality,

however, these resources are renewable only to the extent that the rate of their extraction or use is less than the rate at which they are replenished by nature. Sometimes used in the same context as "renewable energy." See *Non-Renewable Resources*.

Repair

To mend, or put into good condition, something which can then be reused instead of being thrown away. Often referred to as an activity within reuse - the second "R" of the 3Rs of waste management.

Residential Waste

Waste produced by all types of households, including detached dwellings, row housing, condominiums and apartments. In Ontario, residential waste makes up about 40 per cent of the total municipal solid waste stream. See *Municipal Solid Waste*.

Residual Waste

The materials remaining after all efforts have been made to reduce, reuse and recycle. Usually, these materials have to be put in approved landfill sites. Only residual waste is properly refered to as "garbage." See *Garbage*.

Returnable Container

Container which can be taken back to a specific location, often a store. In return, a person receives a refund of a deposit paid when product was originally purchased. Returnable containers are sometimes refilled (e.g. carbonated soft drink bottles); others are recycled (e.g. beer cans).

Reusable Product

Something which can be used again for the same, similar or different purpose. Reusing some items for craft purposes can give the items a second life prior to being discarded; provided that the items are not a refillable container/returnable containers or if recyclable, that they are not used in ways which prevents them from being collected by in a recycling program.

Reuse

To use something again in its original form for the same or different purpose. See *3Rs of Waste Management.*

Risk Assessment

When applied to waste management: a way of measuring the significance of a waste problem for its impact on the environment or human health. Risk assessment is a relatively new and controversial field of study. There is often disagreement on how the environmental or health risk of a waste or waste disposal facility is to be measured.

Secondary Recycling

Recycling which makes entirely different products out of the reprocessed materials (e.g. making egg cartons from used newspapers; making a filler for asphalt from glass bottles; making a wood substitute from mixed plastics). These process are not as efficient as primary recycling but are definitely better than landfilling the materials.

Semi-Permeable Material

Substance which allows the passage, or movement, of some selected materials through it. See also Permeable and Impermeable.

Shredding

Using various machines to reduce the size of waste materials in order to facilitate their reprocessing and /or disposal.

Shrink-Wrap Packaging

Packaging that uses a thin layer of plastic, shrunk to the exact size and shape of the product; sometimes used to attach the product to a paper or plastic board. It is similar to, but tighter than, blister packaging. Such packaging does not easily lend itself to recycling.

Soil Conditioner

Material useful when added to soils because of its nutrient content and/or its water-draining

or water-holding properties. See *Compost*.

Solid Waste

See *Municipal Solid Waste*.

Source Separation

The purposeful segregation of used materials from municipal waste into specific material categories at the point of generation, or where the waste is created. The generator may separate recyclables from other waste, but further sorting is required. Some municipalities further sort recylables into separate compartments in the collecting trucks; others co-mingle the recyclables for sorting at another location. Curbside sorting is much more efficient, and the materials are much more marketable because they have less contaminants.

Styrofoam

Trademark name for a specific type of foamed foamed polystyrene used as rigid building insulation. There is no such thing as a "styrofoam" cup. See *Polystyrene*.

Surface Water

Water that is found on the surface of the earth in lakes, ponds, rivers, streams, etc. See *Groundwater*.

Synergistic Effect

The result when two or more substances cause an effect that is greater than the sum of the effects of the individual substances.

Teratogen

A substance, or agent (e.g. radioactivity), that causes birth defects.

Thermal Pollution

The release of heat-bearing wastes into the environment (e.g. water that is used for cooling

by various industries becomes warm and is released into local surface water).

Throwaway Society

See *Consumer Society*.

Tipping Fee

The amount of money charged by the operator of an approved waste disposal facility for receiving and managing waste. The charge is based on either the weight or volume of the waste. Often a tipping fee is higher than the actual operating costs of the facility, so that the extra funds can be used by a municipality for its 3Rs programs.

True-Cost Accounting

Recording all the costs - including the environmental and social costs - of managing the waste generated from the use of a particular product or packaging. Also known as "full-cost accounting," the sum total of all costs is usually what we as a society have to pay for the management of waste. Unfortunately, these costs are often not evident in the price of a product or a service. See *Polluter Pays*.

Toxic Substances

Materials, solid, liquid or gaseous, which are harmful, or poisonous. They are sometimes called 'toxics'; not to be confused with 'toxins'.

Toxins

Harmful, or poisonous, substances created in, or by, living organisms, such as bacteria' They form a sub-group of 'toxic substances'.

Transfer Station

Facility used to receive and temporarily store waste and/or recyclable materials until they are shipped to another site for reprocessing or disposal.

Vermicomposting

Composting using worms to digest the organic materials provided; can be done indoors. For details, refer to specific instructions/suggestions.

Waste

Solid, liquid or gaseous materials left over after various processes in homes, schools, businesses, institutions and industries. Unwanted materials, previously thought to be useless, often are carelessly released into the environment. Many of the materials can be reused, recycled or not produced in the first place.

Waste-Derived Fuel

See *Refuse-Derived Fuel.*

Waste Disposal

Placing waste for long-term storage in a landfill site or in an incinerator for partial destruction. Waste disposal facilities must be certified for use. Their purpose is to keep the waste from entering into the environment.

Waste Diversion

Using the 3Rs of waste management as part of a strategy to keep used materials from going to disposal. See *3Rs of Waste Management.*

Waste Generator

The person, business, institution or industry which has created waste materials.

Waste Management

The management of waste and used materials through the 3Rs and disposal. Proper waste management puts first emphasis on waste reduction, reuse and recycling, before disposal methods are used. See *3Rs of Waste Management; Waste Disposal.*

Waste Management Master Plan

A long-term plan for the design and implementation of a waste management system to service the waste needs of a particular area.

Waste Management System

All the facilities, buildings and equipment used for the collection, treatment and disposal of wastes, and for the reduction of used materials going to disposal. A complete waste management system consists of disposal and diversion components. A waste management system is defined for a particular "service area," which is the population living in one or more municipalities.

Wastewater

See *Effluent*.

Wet/Dry Recycling

A program which involves the collection of both the regular dry recyclables, such as cans and bottles, and wet compostables, such as kitchen wastes.

SOME COMMONLY USED ABBREVIATIONS

C of A	Certificate of Approval
EFW	Energy From Waste
EA	Environmental Assessment
EAA	*Environmental Assessment Act*
EPA	*Environmental Protection Act*
HHW	Household hazardous waste
IC&I	Industrial, Commercial and Institutional

MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NIMBY	"Not In My Backyard"
OCC	Old Corrugated Cardboard
ONP	Old Newsprint
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
PET	Polyethylene terphathalate
PS	Polystyrene
3Rs	Reduce, Reuse, Recycle
RDF	Refuse-Derived Fuel

For more information on waste issues contact:

Environment Ontario
Public Information Centre
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

Telephone: (416) 323-4321
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PIBS #1828
01/92

ENVIRONMENT INFORMATION - ENVIRONNEMENT

WINTER 1992

Ontario Environment Environnement

ENVIRONMENTAL APPROVALS FOR WASTE DISPOSAL SITES

Since 1971 all municipally and privately owned waste disposal sites for municipal waste in Ontario have required approval from the Ministry of the Environment under the *Environmental Protection Act* (EPA). A waste disposal site is defined as any land, building or land covered by water in which waste is deposited or processed. Furthermore, Section 30 of the EPA requires the ministry to refer all applications for waste disposal sites for industrial or hazardous waste or municipal waste from more than 1,500 people to the Environmental Assessment Board for a public hearing under the *Environmental Assessment Act*.

THE ENVIRONMENTAL ASSESSMENT ACT

The *Environmental Assessment Act* (EAA) was passed in 1975. Its purpose is to help protect, conserve and manage wisely Ontario's environment through sound planning.

The act defines environment quite broadly to include not only the natural environment - air, water and soil - but also the economic, social, cultural and built environment of the immediate area. Built environment includes anything - such as buildings and control systems - which may be constructed on the waste disposal site.

Under the act, the proponent - the person or organization making the proposal - must justify the waste disposal project. The proponent must demonstrate the need for the project and the site chosen, describe the alternatives considered and the criteria used in making the decision.

If a municipality, as the proponent, submits an application for a waste management system - and such a system may include waste disposal sites as well as blue box collection programs, neighborhood depots for glass, newspaper and metal cans and hazardous waste collection days - then the municipality has a choice. It may get approval for either the entire waste management system under the EAA or for each 'major' component of the system. Major components include a landfill site, a transfer station taking more than 300 tonnes per day or a processing facility taking more than 200 tonnes a day. Currently, what are called the 'minor' components of a waste management system, such as blue boxes and household hazardous waste days, only require approval under the EPA. A private company submitting a proposal for a waste management system is under no statutory obligation to get the system approved under the act. But, the individual 'major' components must be approved under the EAA.

ENVIRONMENTAL ASSESSMENT

The environmental assessment (EA) process is a planning process which involves full consideration of the following:

- Reasons or need for the project, which is usually referred to as the undertaking;

- Alternatives to the undertaking; in the case of a waste disposal site a comprehensive waste reduction program may be considered an alternative;

- The environment which may be affected and the possible effects of the project on the environment. Environment is defined to include the natural, social, economic, built and cultural environment;

- The steps required to mitigate the possible effects on the environment;

- A thorough and systematic evaluation of the alternatives and their predicted environmental effects.

The following are some of the key steps in the approval of an environmental assessment for a waste disposal site:

Responsibility

The proponent has the responsibility of doing the environmental assessment and of preparing the EA document.

Submission

The EA document is submitted to the Minister of the Environment who then sends the environmental assessment to all interested provincial government ministries and agencies for review.

Government Review

The ministry's Environmental Assessment Branch compiles the comments from the other ministries, reviews the document and then submits the government review back to the Minister.

Public Review

The Minister releases the EA document and the review of it to the public for comment. Members of the public have a minimum of 30 days to respond in writing to the Minister.

Advice

Ministry staff members are available to advise the proponents, government ministries and agencies as well as members of the public on the EA document.

Acceptance

At this point, the Minister may either accept the environmental assessment of the project or refer it to the Environmental Assessment Board. The board consists of 10 full-time members and nine part-time members appointed by Cabinet by Order-in-Council.

Second Public Review

If the Minister accepts the EA document, then there is a second public review of 15 days. If there are no objections, and no requests for a hearing, then the Minister and Cabinet decide whether or not to approve the project.

Public Hearing

When there are objections to the proposal, the Minister may refer the EA document to the Environmental Assessment Board for a formal public hearing.

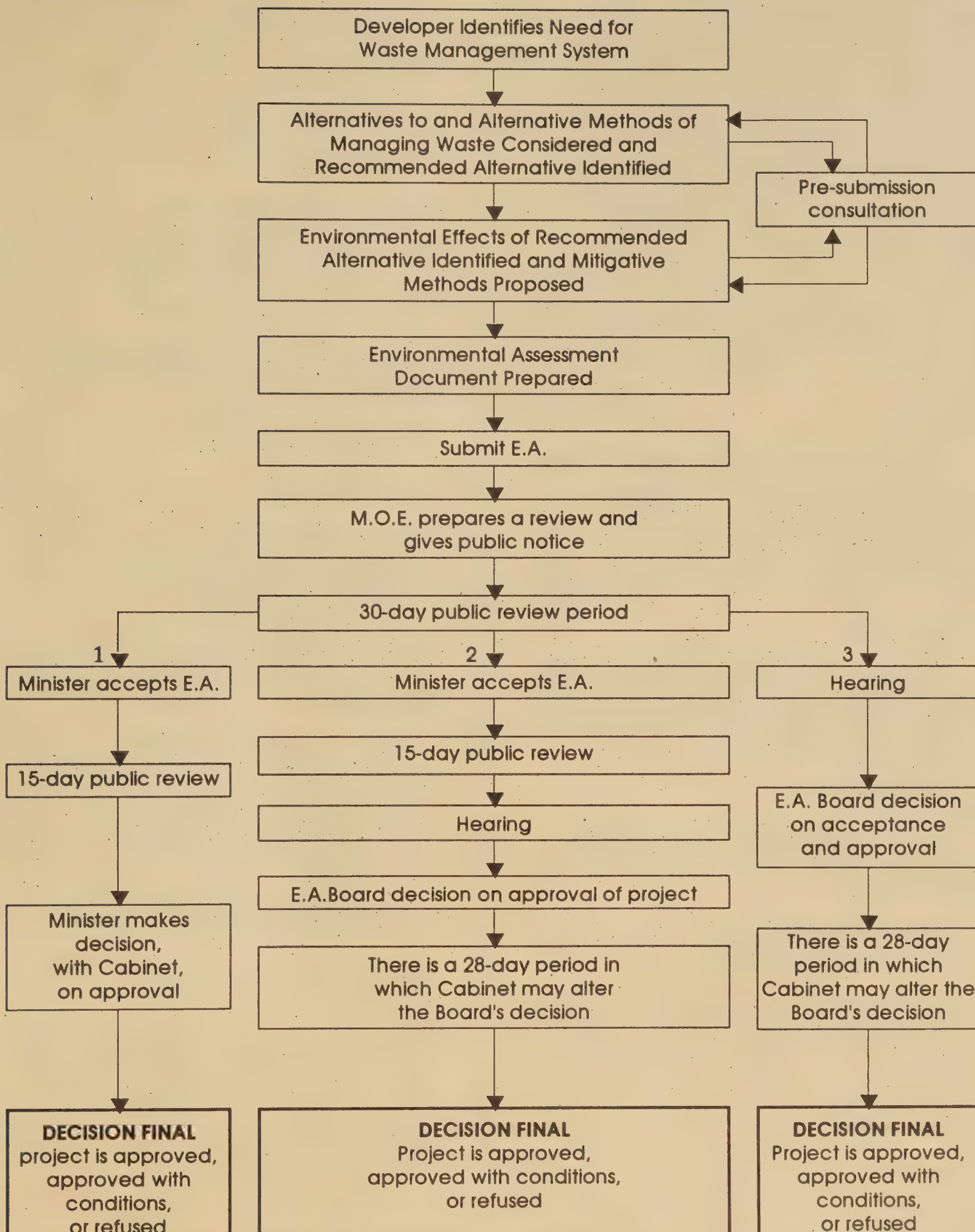
The Environmental Assessment Board hearing gives the proponent, public, municipalities and interested government agencies and ministries the chance to present their cases.

Board Approval

The board then decides whether or not to approve the undertaking based on the EA planning document, the government's review of the document, any further documentation submitted during the hearing, and the testimony of the interested parties.

Whatever the board's decision, the Cabinet has 28 days to alter it. Any party which had standing at the hearing has the option of challenging the board's decision in the Supreme Court of Ontario.

THE ENVIRONMENTAL ASSESSMENT PROCESS



NOTE: E.A. refers to Environmental Assessment M.O.E. refers to Ministry of the Environment

THE ENVIRONMENTAL PROTECTION ACT

The *Environmental Assessment Act* (EAA) requires the "front-end" planning for a waste management project, while the *Environmental Protection Act* (EPA) requires the issuance of Certificate of Approval to establish and operate a facility. Part V of the EPA deals with waste management and governs the approval of waste disposal sites and waste management systems. Sometimes the process is referred to as "Part V approval" for short. Another major difference between the two acts is that the definition of "environment" in the EPA is narrower than in the EAA. In an EPA approval, the proponent is required to consider only the potential effects of the project on the natural environment (air, land, water, land, plant and animal life), including transportation and noise aspects.

Submission

Typically, the ministry requires proponents, either private or municipal, to submit three separate documents when applying for a Certificate of Approval - a ministry application form, hydrogeological study and an operation and development plan.

Application Form

The application form asks for general information such as the applicant's legal name as well as the size, capacity and location of the site and the quantities and types of waste.

Hydrogeological Study

The hydrogeological study of the proposed site and the immediate vicinity must include detailed information on:

- Regional and local geology as well as existing site contours and drainage patterns;
- Local hydrogeology such as the nature of the soil and its stratification and permeability as well as vertical and horizontal gradients and the background quality of the ground water and its flow patterns;
- Interpretation of the data;
- Conclusions and recommendations.

Operation and Development Plan

The operation and development plan must cover in detail subjects such as:

- Site design;
- Population to be served;
- Site preparations;
- Types and quantities of waste;
- Environmental control measures;
- Stages of the site development;
- Monitoring programs for groundwater, surface water, methane gas and leachate while the site is open and after it is closed;
- Vermin and litter control;
- Contingency plans for fire and leachate control;
- Site fencing, signs and security plans as well as site buildings, scales, internal roads and access roads;
- Plans for closing the site;
- Funding - for private proponents.

Ministry Review

Ministry staff review and comment on the EA documents (application, hydrogeological study, operation and development plan) submitted for approval of waste disposal sites which fall under Part V of the EPA and are not subject to the Environmental Assessment Act. The purpose of the review is to ensure that the documents are technically complete before they are forwarded to the Environmental Assessment Board.

Environmental Assessment Board

The ministry submits the completed proposal (the application form, hydrogeological study and operation and development plan) to the board along with a certified list of adjacent property owners to be notified of the formal public hearing. If the ministry is a party to the hearing, then staff will include the proposed conditions for the landfill site.

The Environmental Assessment Board may consider the technical information required under the EPA at the Environmental Assessment hearing. If the board decides not to consider this information, then the board, if it approves the environmental assessment, may require the proponent to have the technical reports under the EPA approved by the ministry.

Environmental Assessment Board Decision

The Environmental Assessment Board makes the final decision under the EPA on the proposal for the landfill site taking into the consideration the conditions suggested by the ministry and other parties to the hearing.

Provisional Certificate of Approval

If the board approves the project, the ministry issues a provisional Certificate of Approval which is signed by the Director of the ministry's Approvals Branch.

Appeal

The board's decision may be appealed to divisional court, if the appeal is based on a legal question. Appeals based on planning questions go to the Minister and Cabinet. To amend the provisional Certificate of Approval, the Approvals Branch needs a recommendation for the change from the regional director and the local district officer.

CURRENT INITIATIVES

- The ministry is in the process of reforming the Environmental Assessment program. The recommendations contained in a discussion paper released about a year ago include clarifying the roles and responsibilities of those involved in the EA process, developing criteria to assist in decision-making and establishing time limits for the review and decision-making processes. The EA reform will make the process more efficient, effective and fair.

- The ministry is proposing changes to the process for waste management master plans. These plans are usually developed by regional or county municipalities and large cities. One objective is to speed up the process of finding waste disposal sites by considering earlier the ground rules for finding sites.

- The ministry is also looking at accelerating the approvals process for recycling sites, such as leaf and yard material composting sites. The proposed changes would offer a new definition of municipal recyclable material and a classification of the types of recycling sites. The changes also allow the proponent of a recycling site to either apply to the ministry for a Certificate of Approval under the EPA or to go the much simpler route of demonstrating compliance with a set of standards for a recycling site to the satisfaction of the ministry.

For more information on waste issues contact:

Environment Ontario
Public Information Centre
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

(416) 323-4321
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PIBS # 1825
01/92

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d'aménagement et d'exploitation) à la Commission avec une liste certifiée des propriétaires des terrains adjacents au lieu, lesquels seront avisés de la tenue d'une audience publique. Si le Ministère représente l'une des parties à l'audience, le personnel du Ministère inclura alors les conditions qu'on se propose d'assortir à l'autorisation.

La Commission des évaluations environnementales peut tenir compte des renseignements techniques exigés aux termes de la *Loi sur la protection de l'environnement*, à l'audience sur l'évaluation environnementale. Si la Commission décide de ne pas tenir compte de ces renseignements, alors elle peut, s'il elle autorise l'évaluation environnementale, exiger du promoteur qu'il fasse approuver par le Ministère les rapports techniques exigés aux termes de la *Loi sur la protection de l'environnement.*

La décision de la Commission des évaluations environnementales

La Commission des évaluations environnementales rend la décision finale, en vertu de la *Loi sur la protection de l'environnement*, sur le projet de lieu d'enfouissement, en tenant compte des conditions suggérées par le Ministère et les autres parties présentes à l'audience.

Le certificat d'autorisation provisoire

Si la Commission autorise le projet, le Ministère délivre un certificat d'autorisation provisoire, signé par le directeur de la Direction des autorisations du Ministère.

L'appel

On peut porter la décision en appel à la Cour divisionnaire, si l'appel est fondé sur une question juridique, et au Ministère et au Cabinet, si l'appel concerne des questions de planification. Pour modifier le certificat d'autorisation provisoire, la Direction des autorisations, a besoin d'une recommandation du directeur régional et de l'agent de district local concernant la modification.

PROJETS EN COURS

- Le Ministère est sur le point de réformer le programme d'évaluation environnementale. Les recommandations contenues dans un document de travail paru il y a de cela un an mentionnent qu'il faut préciser les rôles et les responsabilités des participants au processus d'évaluation environnementale, établir des critères pour faciliter la prise de décisions et des délais pour l'examen et les processus décisionnels. La réforme des évaluations environnementales rendra le processus plus efficace et plus équitable.

- Le Ministère propose d'apporter des modifications au processus d'élaboration des plans directeurs de gestion des déchets. Ces plans sont généralement conçus par des municipalités régionales et de comté et des grandes villes. Un des objectifs est d'accélérer le processus de sélection des lieux d'élimination des déchets en tenant compte plus tôt des règles de sélection de base.

- Le Ministère cherche aussi à accélérer le processus d'autorisation pour la réutilisation des lieux en centre de compostage de déchets de jardin et de feuilles. Les modifications proposées permettraient d'élargir la définition des matériaux urbains recyclables et de modifier la classification des installations de recyclage. Les modifications permettraient aussi aux promoteurs d'une installation de recyclage d'obtenir du Ministère un certificat d'autorisation, en vertu de la *Loi sur la protection de l'environnement*, ou simplement de montrer que l'installation respecte les normes du Ministère.

Pour obtenir plus de renseignements sur la gestion des déchets, s'adresser au :

Ministère de l'Environnement de l'Ontario
Centre d'information
135, avenue St. Clair ouest
Toronto (Ontario)
M4V 1P5

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PIBS# 1825
02/92

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LA LOI SUR LA PROTECTION DE L'ENVIRONNEMENT

La *Loi sur les évaluations environnementales* prévoit la planification préliminaire pour un projet de gestion des déchets, alors que la *Loi sur la protection de l'environnement* prévoit l'obtention d'un certificat d'autorisation pour mettre en marche et exploiter une installation. La partie V de la Loi traite de la gestion des déchets et régit l'autorisation des lieux d'élimination des déchets et des systèmes de gestion de déchets. Il arrive qu'on abrège le titre par «autorisation aux termes de la partie V ». Les deux lois diffèrent aussi par leur définition d'«environnement », celle de la *Loi sur la protection de l'environnement* étant plus restreinte que celle de la *Loi sur les évaluations environnementales.* Dans une autorisation aux termes de la *Loi sur la protection de l'environnement*, le promoteur doit uniquement tenir compte de l'incidence possible du projet sur l'environnement naturel (air, terre, eau, flore et faune), y compris l'aspect du bruit et du transport.

La soumission

Habituellement, le Ministère demande aux promoteurs privés ou aux municipalités de soumettre trois documents différents pour une demande de certificat d'autorisation, c'est-à-dire un formulaire de demande du Ministère, une étude hydrogéologique et un plan d'aménagement et d'exploitation.

Le formulaire de demande

Dans le formulaire de demande, on demande des renseignements généraux, comme la raison sociale du demandeur, la grandeur, la capacité et l'emplacement du site et la quantité et le type de déchets.

L'étude hydrogéologique

L'étude hydrogéologique du lieu proposé et des environs immédiats doit contenir des renseignements détaillés sur :

- la géologie locale et régionale, le profil du site et le réseau hydrographique;
- l'hydrogéologie locale, comme la nature du sol, sa stratification et sa perméabilité, les gradients verticaux et horizontaux et la qualité de l'eau souterraine et son mode d'écoulement;
- l'interprétation des données;
- les conclusions et les recommandations.

Le plan d'aménagement et d'exploitation

Le plan d'aménagement et d'exploitation doit traiter de façon détaillée :

- de la conception du lieu;
- de la population à desservir;
- de la préparation du lieu;
- des types et de la quantité de déchets;
- des mesures de contrôle de l'environnement;
- des étapes d'aménagement du site;
- des programmes de surveillance de la qualité de l'eau souterraine et de l'eau de surface, des émissions de méthane et du lixiviat, pendant l'exploitation du lieu et après sa désaffectation;
- du contrôle de la vermine et des détritus;
- des mesures à prendre dans la lutte contre les incendies et pour contenir le lixiviat;
- du clôturage du lieu, des plans de signalisation et de sécurité, des bâtiments, des échelles, des routes internes et des voies d'accès;
- des plans de désaffectation du lieu;
- du financement, dans le cas de promoteurs privés.

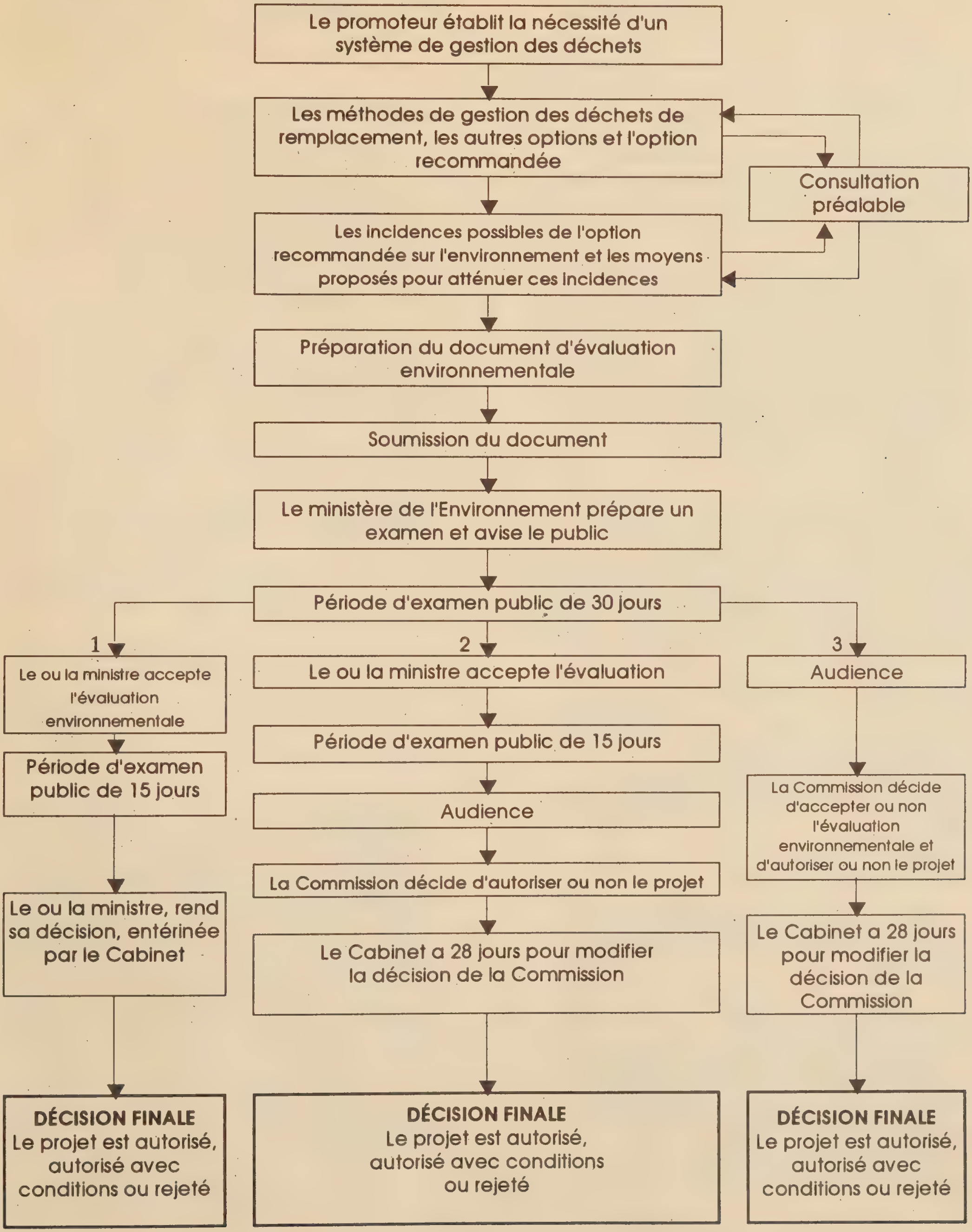
L'examen du Ministère

Le personnel du Ministère examine les documents d'évaluation environnementale (formulaire de demande, étude hydrogéologique, plan d'aménagement et d'exploitation) soumis pour autorisation des lieux d'élimination des déchets, conformément à la partie V de la *Loi sur la protection de l'environnement* et qui ne sont pas sujets à la *Loi sur les évaluations environnementales* et fait part de ses commentaires. L'examen a pour but de s'assurer que les documents sont pratiquement complets avant d'être envoyés à la Commission des évaluations environnementales.

La Commission des évaluations environnementales

Le Ministère soumet la proposition complète (formulaire de demande, étude hydrogéologique, plan

LE PROCESSUS DE L'ÉVALUATION ENVIRONNEMENTALE



L'ÉVALUATION ENVIRONNEMENTALE

Le processus de l'évaluation environnementale est un processus de planification qui prévoit l'examen des points suivants :

- les raisons ou le bien-fondé du projet, que l'on appelle habituellement l'entreprise;
- les solutions de rechange; dans le cas d'un lieu d'élimination des déchets, un programme de réduction des déchets peut être considéré comme une solution de rechange;
- l'environnement touché et les incidences possibles du projet sur l'environnement. Par environnement, on entend l'environnement naturel, le cadre bâti et le milieu social, économique et culturel;
- la marche à suivre pour atténuer l'incidence possible du projet sur l'environnement;
- une évaluation exhaustive et systématique des solutions de rechange et leur incidence prévue sur l'environnement.

Vous trouverez ci-dessous, quelques-unes des étapes importantes de l'autorisation d'une évaluation environnementale pour l'aménagement d'un lieu d'élimination des déchets.

La responsabilité

Il incombe au promoteur d'effectuer l'évaluation environnementale et de préparer le document d'évaluation environnementale.

La soumission

Le document d'évaluation environnementale est présenté au ministre ou à la ministre de l'Environnement, qui l'envoie alors à tous les ministères et organismes provinciaux à des fins d'examen.

L'examen gouvernemental

La Direction des évaluations environnementales du Ministère compile les commentaires des autres ministères, examine le document et soumet le rapport d'examen gouvernemental au ministre ou à la ministre.

L'examen public

Le ou la ministre rend public le document d'évaluation environnementale et l'examen. Le public a un minimum de 30 jours pour présenter ses commentaires par écrit.

La consultation

Le personnel du Ministère peut conseiller les promoteurs, les ministères et les organismes gouvernementaux, ainsi que les membres du public en ce qui concerne le document d'évaluation environnementale.

L'autorisation

À ce stade, le ou la ministre peut accepter l'évaluation environnementale du projet ou la renvoyer devant la Commission des évaluations environnementales. La Commission est composée de dix membres à temps plein et de neuf membres à temps partiel, désignés par décret du Cabinet.

Le deuxième examen public

Si le ou la ministre accepte le document d'évaluation environnementale, un second examen public, de 15 jours, a alors lieu. S'il n'y a pas d'objections, ni de demande d'audience, le ou la ministre et le Cabinet décident d'autoriser ou non le projet.

L'audience publique

Lorsqu'il y a des objections, le ou la ministre peut renvoyer le document d'évaluation environnementale devant la Commission des évaluations environnementales pour la tenue d'une audience publique formelle.

L'audience de la Commission des évaluations environnementales permet au promoteur, au public, aux municipalités, aux ministères et aux organismes gouvernementaux intéressés de présenter leurs arguments.

L'autorisation de la Commission

La Commission décide alors d'approuver ou non l'entreprise, en se fondant sur le document d'évaluation, l'examen du document effectué par le gouvernement, la documentation supplémentaire présentée à l'audience et le témoignage des parties intéressées.

Quelle que soit la décision de la Commission, le Cabinet a 28 jours pour la modifier. Toute partie présente à l'audience peut porter la décision de la Commission en appel devant la Cour suprême de l'Ontario.

ENVIRONMENT INFORMATION - ENVIRONNEMENT

HIVER 1992

Ontario Environment Environnement

AUTORISATIONS ENVIRONNEMENTALES DES LIEUX D'ÉLIMINATION DES DÉCHETS

Depuis 1971, tous les lieux d'élimination des déchets privés ou municipaux en Ontario doivent obtenir une autorisation du Ministère, en vertu de la *Loi sur la protection de l'environnement.* On entend par lieu d'élimination des déchets tout terrain, bâtiment ou terrain immergé, où sont déposés ou traités des déchets. De plus, l'article 30 de la Loi stipule que le Ministère doit renvoyer toutes les demandes d'autorisation de lieux d'élimination de déchets industriels ou de déchets dangereux, ou encore d'ordures ménagères provenant de plus de 1 500 personnes à la Commission des évaluations environnementales pour la tenue d'une audience publique aux termes de la *Loi sur les évaluations environnementales.*

LA LOI SUR LES ÉVALUATIONS ENVIRONNEMENTALES

La *Loi sur les évaluations environnementales* a été adoptée en 1975. Elle a pour but d'aider à protéger, conserver et gérer judicieusement l'environnement de l'Ontario par une planification saine.

La Loi définit l'environnement de façon très large, incluant non seulement l'environnement naturel — air, eau et terre — mais aussi le milieu social, économique et culturel, ainsi que le cadre bâti de la région immédiate. Le cadre bâti comprend tout ce qui peut être construit sur le lieu d'élimination des déchets, comme les bâtiments ou les systèmes de contrôle.

Selon la Loi, le promoteur — personne ou organisme qui fait la proposition — doit justifier son projet d'élimination des déchets. Il doit montrer le bien-fondé du projet et du choix du site et décrire les solutions de rechange étudiées ainsi que les critères qui l'ont aidé à arrêter son choix.

Si une municipalité soumet à titre de promoteur une demande d'autorisation pour l'aménagement d'un système de gestion des déchets — lequel peut comprendre des lieux d'élimination des déchets, des programmes de recyclage dits de la « boîte bleue », des centres municipaux de récupération du verre ou des boîtes de fer-blanc et des journaux, ou l'organisation de jours de collecte des déchets dangereux — elle a alors un choix. Elle peut obtenir une autorisation pour tout le système en vertu de la *Loi sur les évaluations environnementales* ou pour chaque composante principale du système. On entend par composante principale un lieu d'enfouissement, une station de transfert qui peut recevoir plus de 300 tonnes de déchets par jour ou une usine de traitement qui peut en recevoir plus de 200. Actuellement, dans le cas des composantes mineures d'un système de gestion des déchets, comme les boîtes bleues et les jours de collecte des déchets domestiques dangereux, il suffit d'une autorisation en vertu de la *Loi sur les évaluations environnementales.* Une entreprise privée qui soumet une demande pour un système de gestion des déchets n'est pas légalement tenue d'obtenir une autorisation pour l'aménagement du système conformément à la Loi. Toutefois, chaque composante principale doit être autorisée en vertu de la *Loi sur les évaluations environnementales.*

ENVIRONMENT INFORMATION - ENVIRONNEMENT

WINTER 1992

Ontario Environment Environnement

THE LANDFILLING OF GARBAGE

Every year Ontario's residents and industries produce about 10 million tonnes of municipal solid waste, more commonly known as "garbage." The residential sector is responsible for about 40 per cent of the total municipal solid waste stream, while the industrial, commercial and institutional (IC&I) sector is responsible for about 60 per cent. In 1989, the latest year for which the most complete information is available, about 90 per cent of all garbage generated in Ontario was disposed of in landfills. Ontario has about 1,400 landfill sites in operation. Some landfills are owned and operated by municipalities; others are privately owned and operated.

While many communities have implemented effective waste reduction or 3Rs (reduction, reuse, recycling) programs, there is a continuing need to dispose of the remaining wastes in landfill sites. The best site for a landfill is generally one with a natural clay base, which will aid in the prevention of groundwater contamination. After a landfill is filled to capacity, it is "capped" with a thick layer of soil. Vegetation is planted on top of the cap. If properly designed and managed, the landfill can then be reclaimed for recreational purposes. However, while in operation and even after it is closed, a landfill site must be carefully monitored for environmental problems. The wastes it contains will be stored there in virtual perpetuity.

LANDFILL DESIGN

Landfilling Techniques

A landfill is not just a hole in the ground where waste is randomly buried. The landfilling of solid wastes takes place under controlled conditions. There are three general types of landfilling techniques: area fill, trench fill, and modified area fill.

• ***Area Fill:*** In this landfilling technique, a surface area of ground is prepared for storing waste. Garbage is brought in by a truck, then pushed and compacted by a bulldozer in layers about 40 to 75 cm thick. When the thickness of the compacted wastes reaches about three metres, and also at the end of each day's operation, about 15 cm of cover material (usually soil) is put on top.

A completed fill section, including the cover material, is called a "cell." Filling always proceeds from completed cells. As each waste cell is filled with garbage and then covered, a new one is begun. When the first layer of cells is filled and covered, waste is piled on top in new cells. A filled waste cell located on top of another waste cell is called a "lift." The process continues until the landfill reaches its approved height.

The area fill method requires large surfaces of land with moderate and rolling terrain. However, it can handle large volumes of garbage which must be densely compacted to maximize the amount of space available. The drawbacks of an area fill is that it takes up large areas of land, it requires extensive cover material, which may have to be brought in from elsewhere, and it is costly to build.

• ***Trench Fill:*** In the trench method of landfilling, waste is spread and compacted in an excavated trench below ground level. A trench can be up to 9 m deep and 30 m wide. It can be continuously expanded in length as far as space permits. Garbage is deposited into the end of a trench from

the top of the trench wall. It is then compacted into layers by a bulldozer inside the trench until the desired height is reached. At the end of the day, the compacted garbage is covered with the soil excavated from the trench or from adjacent trenches. As one trench is filled to completion, a subsequent trench is excavated beside it. Each trench is completely independent of the other.

The trench fill method is mostly suitable for the disposal of small volumes of garbage, as well as specialized wastes such as sludge, wood wastes and demolition materials. It produces less gas and leachate production per tonne of waste than other methods and there is better litter control. Another advantage is that a trench landfill is not as high as an area landfill. However, a disadvantage of trench filling is that space is used less efficiently than with an area method because of the need for land to separate the trenches.

• ***Modified Area Fill:*** In a modified area landfill, a single or a row of waste cells may be excavated below ground level. The soil is stockpiled for use as a daily cover. The waste is brought in by truck. The truck enters into the waste cell and tips the garbage along a moderately sloped back wall of the excavated cell. Waste is then compacted in an uphill fashion into the back wall. The construction of additional waste cells is similar to that of the area fill method.

The modified area method is more typical of current landfilling practices for medium to large facilities (at least 180 tonnes of garbage a day) than either the area or trench method. It is flexible and can use either of the techniques described above. In fact, many facilities begin as a trench landfill, altered by the modified area method. Like the trench fill method, it is generally used for landfills intended to be below ground level. However, a modified area fill has higher capital costs and tends to produce more leachate and gas than the trench method.

Buffer Zone

All modern landfill sites must be surrounded by an area of land that may not be used for garbage fill or development such as housing, schools, shopping plazas and industry. This area or buffer zone is used to minimize the impact that the site might have on adjacent lands from odours, noise, dust and litter. The width of the buffer zone may range anywhere from 30 to 500 metres, depending on the size of the landfill site.

Landfill Equipment and Facilities

Different types of bulldozers, compactors, scrapers, loaders, graders and other heavy equipment and trucks are required for different sized operations. Landfill sites also need access roads (on and off-site), scales to weigh vehicles entering the site, and administrative buildings. Various other facilities are need for environmental protection, such as leachate treatment facilities and earthen berms as noise buffers. These are discussed below.

Some municipalities haul garbage to landfill sites located at a considerable distance from the collection points. A waste transfer station or stations may be needed. At the transfer station, waste may be first compacted then periodically transported by larger trucks to landfill sites. Hence, fewer trucks are required to haul waste to the actual landfill site; thereby, reducing transportation costs and potential impacts on an adjacent community.

INCREASING LANDFILL CAPACITY

Waste deposited at landfills is normally compacted so that as much as possible can be put into a given space. As well, landfills naturally settle over time as wastes consolidate, collapse, or decompose. However, a number of methods exist which help to speed up the compaction and settling of wastes can be used to increase the amount of space available in a landfill.

Surcharging

The most typical method for increasing landfill capacity, surcharging places extra cover material or waste in a site without going beyond the planned contours but in such a way as to increase settlement. The accelerated settlement achieved through surcharging permits the addition of waste beyond normal site capacity without changing the planned height or contour of the site. However, the amount of extra space gained by surcharging a landfill is very limited. As well, it requires the availability of an extensive amount of soil cover.

Shredding and Baling

Shredding is the shearing or milling of solid waste into small pieces. Baling is the compacting of solid wastes into dense rectangular bales. Neither method is currently practised in Ontario. The reported advantages of both methods are that they increase

in-place waste density and reduce daily cover requirements, debris, odour, and vermin problems. Generally, both methods improve site appearance.

The drawbacks to both shredding and baling include the high capital and operating costs, the need for additional space for equipment and facilities, the high frequency of equipment breakdown and the limitation of the technology (not everything can be shredded or baled), which necessitates separate handling of some material.

Landfill Mining

Landfill mining involves the excavation of previously buried waste to reclaim recyclables and organic soil for cover, thus allowing more capacity for additional wastes. It is a new concept which has not been attempted in Canada and only to a limited extent in the United States. Landfill mining appears to work well in warmer climates where decomposition occurs quickly. Costs can be offset by savings in cover requirements, but the technique carries the potential of explosions, noise, odour and other impacts, and exposes workers to hazards. It is not considered a feasible method for a short term extension of existing landfill sites.

Synthetic Daily Cover

The covering of garbage compacted into a waste cell with a synthetic cover, instead of soil, is a relatively new technology.

A synthetic cover has a much lower volume than conventional earth cover. Therefore, the site fills up less quickly. The material used is a urea-formaldehyde-based foam. Not enough is known about its toxicity, its impact on leachate quality and its off-site environmental impacts. The foam has practical problems as well. It washes off during rainstorms; when dry it can be blown away by high winds. In cold weather it requires warm water to activate it. The foam does not discourage birds, rodents and insect pests.

ENVIRONMENTAL PROBLEMS OF LANDFILLING

There are four main environmental problems associated with landfill operations: leachate, gases, nuisance, and loss of farmland.

Leachate

Contaminated runoff, called leachate, is created in all landfills. It is the liquid which results when rain or melting snow percolates through the waste and carries with it the dissolved materials that it has picked up. Off-site leachate movement may contaminate groundwater or surface water. The organic matter contained in the leachate can speed up the natural aging of lakes in a process called eutrophication. It can also contain many toxic substances, such as heavy metals. Leachate has more heavy metals if the rain or snow is acidic, since metals dissolve more easily in acidic water.

Gas

As landfill wastes decompose, gases such as methane, carbon dioxide and hydrogen sulphide are created. It is also known that gas generated in landfills can contain such toxic substances as hydrogen sulphide, benzene, and vinyl chloride. Gas production, even in a closed landfill, could continue for centuries.

Because of some of the toxic substances which they contain, landfill gases may kill final vegetation cover on the landfill; they also create unpleasant odours. The health effects that these gases may have on people living near landfill sites have not been widely studied. It is also possible for these gases to accumulate in houses by seeping through basement walls. With methane there is a danger of the gas exploding at concentrations in the air of between 5 and 15 per cent.

Nuisance

In addition to the environmental concerns raised by landfill sites, there are also some nuisance factors, such as gulls, vermin, odour and blowing litter. These, however, can be reduced by frequently covering the sites with earth and by screening the area to catch trash.

Increased truck traffic with its accompanying noise, stirred up dust and blowing litter, also creates problems. Some solutions are to designate truck routes, reduce speed limits, require trucks to cover their loads, and to enforce strict hours of operations. Large mounds of earth, called berms, may also be built around the perimeter of the landfill to reduce the impact of noise.

Loss of Farmland

Unfortunately, many of the best locations for landfills are often on prime agricultural lands. Not only is valuable farmland lost, but there may also be a negative impact on the surrounding farming community. For example, increased truck traffic may interfere with the movement of farm machinery and animals. Another concern is that there is always the possibility of contamination of ground and surface water supplies upon which agricultural operations are dependent. However, with proper site design, operation and closure, it is feasible to return sites to certain agricultural uses.

ENVIRONMENTAL CONTROLS

There are numerous controls in place to minimize the environmental problems associated with landfills. Monitoring systems are included in the design of modern-day landfill sites to ensure that local surface and groundwater is not being contaminated and that the gas collection system is operating properly.

Leachate Control and Monitoring

All landfill sites are monitored during their operating life and after closure to determine whether leachate is moving off-site. To monitor groundwater, wells are placed in the vicinity of the landfill. Their location must be based on careful study of the underlying geology. Leachate may be collected on-site through pipes at the bottom of a landfill. These pipes may empty into sedimentation ponds for on-site treatment or directly into a sewage treatment plant via municipal sewers.

In addition, however, several design approaches for the construction of landfill sites have evolved over the last twenty years to contain the off-site movement of leachate. These designs include natural attenuation, zone of saturation, lined landfill or remediation.

• ***Natural attentuation landfill:*** This practice utilizes natural in-place soils to "attenuate" or cleanse the contaminants from leachate as it seeps through the bottom of a landfill site. The mechanisms of attenuation depend on the characteristics of the soil, and can include filtering, biological degradation, and various other natural chemical reactions that take place in the soil itself. The soil between the bottom of the waste and the water table has to be a very thick bed of silt mixed with clay.

A natural attentuation landfill design has been the traditional method for the control of off-site leachate migration. Many of the sites now also have backup leachate collection systems. However, because of the complexity of water movement and the structure of soils - the actual effectivenss of leachate attenuation is not well known. For this reason, natural attentuation sites present the highest risk to the environment and are unsuitable for all but the smallest landfill sites.

•***The zone of saturation design:*** This leachate containment technique is designed to be applied in areas unsuitable for natural attentuation. Because the sites are in areas with a high water table, the soils tend to be saturated. The placement of waste is actually below the water table. To operate properly, a zone of saturation design requires at least 15 to 20 m compacted clay base. The base is prepared before the waste is deposited in such a way that the leachate flows inward toward the waste to reduce the off-site movement of leachate. Forming small pools at the base, the leachate is then collected and removed for treatment. Since placing waste below the water table is not a widely accepted practice, this type of leachate containment method is not commonly used.

•***Lined landfill design:*** This is the most widely used and accepted design for leachate containment in a landfill. It involves lining a site situated on permeable soils either with an artificial barrier of natural clay or a synthetic sheet known as a "geomembrane." To prevent the buildup of leachate at the base, known as the "bathtub effect", lined landfills are equipped with a full leachate collection system just above the liner and also a network of perforated pipes to drain the leachate to one or more locations within the site. The leachate is then removed from the site via gravity drainage or by pumps for subsequent treatment.

There are a number of sites in Ontario that were lined with a clay base before landfilling; these are mostly larger facilities in active or worked-out sand or gravel pits, such as the Keele Valley Landfill Site north of Toronto. Detailed contingency plans for the possibility of liner failure are required by the Ministry of the Environment.

No sites have been certified in Ontario to use synthetic liners or geomembranes made of high density polyethylene (HDPE). In the United States, some landfills are lined with two geomembranes or use a geomembrane over top of a clay liner. The double-lining provides added protection in case of leakage.

The advantage of an artificial lining is that less agriculturally productive land or mined-out aggregate pits need to be used. The disadvantages are the higher cost (for sophisticated monitoring and leachate collection) and the greater expertise needed to operate the site.

• ***Remediation Landfill Design*:** This design method is used to upgrade older existing sites, which in some cases have contaminated the ground and surface waters. A remediation landfill design uses a dewatering system, often combined with a cutoff wall, to intercept the leachate before it moves off-site. Dewatering may be as simple as placing a perforated pipe in a deep gravel-filled trench around the site. Leachate flow is intercepted and then extracted for treatment. Another design uses numerous drilled wells around the perimeter of the site for the extraction of contaminated groundwater. The effectiveness of the dewatering system is increased with the use of deep cutoff walls to contain the off-site movement of leachate. Cutoff walls are deep trenches dug around the site, filled with clay, or a mixture of clay, cement, and other cement-like materials. These types of systems are very expensive to build and to operate. Often, very large quantities of water are extracted for treatment. In some cases they may require disposal as a hazardous liquid waste.

Gas Control and Monitoring

As with leachate containment, the off-site movement of landfill gas can also be controlled by a liner. More sophisticated gas control systems use piping alternated with layers of solid wastes to vent the gases and prevent the buildup of differential gas pressure in the systems. In some cases, gas removal is enhanced by a pumping system. In larger sites, the recovery of methane as a heating or combustion fuel may be feasible.

THE ECONOMICS OF LANDFILLS

Costs of establishing or extending a landfill increased significantly in Ontario throughout the 1980s, partly as a result of more stringent regulatory requirements governing site selection, engineering, operation, closure monitoring, approval hearings, and application of the *Environmental Assessment Act*

Operating and Capital Costs

Capital and operating costs for landfilling can vary widely depending on a number of factors. These include costs of site investigation, land acquisition, planning, engineering design and approvals, site preparation, equipment and earthmoving machinery, and the construction of access roads, buildings, and various environmental control measures. Other factors which may contribute to the costs of a landfill once it is in operation include average haulage distance, staffing, monitoring, landscaping, equipment replacement, insurance, supply of cover material, provision of closure and post-closure reserve funds, and compensation to neighbouring property owners. A typical landfill site for an urban area can cost tens of millions of dollars to build; and millions of dollars each year to operate. Even after a site is closed, it can cost in the order of hundreds of thousands of dollars each year to monitor, not to mention the costs of cleaning up any environmental problems. A landfill site is a very expensive proposition!

Tipping Fees

Tipping fees are fees paid by the haulers of waste to a receiving municipality or to a site owner when they deposit their materials at a waste disposal site. The revenues earned from tipping fees may be used to cover the costs of operating a landfill. They may also go into "reserve funds" to cover the costs of a municipality's waste reduction program.

There are a variety of ways to charge a tipping fee on a vehicle entry basis. The simplest method is to charge a per vehicle rate for every entry into the landfill. The rates can also be based on vehicle type or hauling capacity. Often a higher tipping fee (in some cases twice as high) is charged to non-residents of the area served by the landfill.

Since 1987 there are has been a dramatic rise in tipping fees for industrial, commercial, and institutional waste. In the Greater Toronto Area, tipping fees rose to $150 per tonne in 1991, and are expected to increase even further. Some landfills charge a premium of up to double the normal tipping fee if a load of garbage includes recyclable or other banned materials. Some smaller municipalities are reluctant to raise their landfill tipping fees for fear that illegal dumping will occur as a result.

LANDFILLING IN ONTARIO

Ontario has approximately 1,400 active landfill sites. Approximately 630 (45 per cent) of these sites serve communities with populations of less than 1,500; these communities constitute almost 10 per cent of Ontario's total population. Another 350 (25 per cent) of Ontario's landfills are operated by the Ministry of Natural Resources (MNR). These landfills are operated to serve provincial parks and other recreational facilities on crown land, areas of seasonal residences (i.e. cottages) and other MNR activities such as clearing associated with reforestation. Many MNR sites also service the disposal needs of rural northern residents. The remaining 420 sites (30 per cent) serve populations greater than 1,500.

Future Trends

Landfills in Ontario are reaching capacity at a steady rate. By the year 2000, nearly 250 currently active landfills are expected to be full. However, as a result of the loss of actual disposal capacity by the closing of landfill sites, more than half of Ontario's residents will have no place to dispose of their garbage by as early as 1996. The loss of landfill space will mean that greater effort will have to be devoted to waste reduction programs and to the development of comprehensive waste management master plans.

ENVIRONMENTAL APPROVALS

There is a trend towards more tightly regulated landfills. This follows from an increased awareness and understanding of the potential environmental damage caused by landfilling activities. As a result, the landfill approval process has also become increasingly stringent. New landfill designs are required to make provisions for leachate control and monitoring, noise, dust and nuisance control.

Since 1971, all municipally and privately-owned landfill sites in Ontario require approval from the Ministry of the Environment under the *Environmental Protection Act* (EPA). Under the Act, a landfill site is defined to include any land, building, or land covered by water in which waste is deposited or processed. Furthermore, Section 30 of the EPA requires the ministry to refer all applications for landfill sites for industrial or hazardous waste, and for municipal solid waste from more than 1,500 people to the Environmental Assessment Board for a public hearing under the *Environmental Assessment Act* (EAA).

For More Information on Waste Issues, Contact:

Environment Ontario
Public Information Centre
Telephone: (416) 323-4321
1-800-565-4923
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

PIBS #1826
01/92

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à la désaffectation de lieux d'enfouissement. Il faudra par conséquent consacrer davantage d'efforts aux programmes de réduction des déchets et à la mise en oeuvre de plans directeurs de gestion des déchets.

LES AUTORISATIONS ENVIRONNEMENTALES

Nous semblons nous diriger vers une plus grande réglementation des lieux d'enfouissement. Ceci découle d'une meilleure compréhension des impacts de l'enfouissement sur l'environnement. Les exigences en matière d'autorisation sont donc de plus en plus rigoureuses. Les plans de lieux d'enfouissement doivent désormais prévoir des dispositions pour la réduction et la surveillance du lixiviat, et pour la réduction du bruit, de la poussière et des nuisances.

Aux termes de la *Loi sur la protection de l'environnement*, l'aménagement de tout lieu d'enfouissement municipal ou privé en Ontario doit, depuis 1971, être autorisé par le ministère de l'Environnement de l'Ontario. La Loi définit un lieu d'enfouissement comme étant tout terrain, bâtiment ou terre submergée servant à l'élimination ou au traitement de déchets. En outre, l'article 30 de la Loi oblige le Ministère à soumettre à la Commission des évaluations environnementales tout projet de construction d'un lieu d'enfouissement pour déchets industriels ou dangereux ou pour déchets solides provenant de localités de plus de 1 500 personnes. La Commission tient alors une audience publique tel que le stipule la *Loi sur les évaluations environnementales.*

Pour obtenir de plus amples renseignements sur la gestion des déchets, s'adresser à :

Environnement Ontario
Centre d'information
135, avenue St. Clair Ouest
Toronto (Ontario) M4V 1P5

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PIBS# 1826
02/92

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LES ENJEUX FINANCIERS

Le coût de la construction ou de l'agrandissement d'un lieu d'enfouissement en Ontario a monté en flèche durant les années 80 en raison, notamment, de l'adoption de règlements plus rigoureux pour la sélection du site, les travaux d'ingénierie, l'exploitation, la surveillance après la désaffectation, les audiences préalables à l'autorisation et l'application de la *Loi sur les évaluations environnementales*.

Les dépenses en immobilisations et les dépenses d'exploitation

Le coût de l'aménagement et de l'exploitation d'un lieu d'enfouissement peut varier énormément en fonction des frais entraînés par les activités suivantes : l'évaluation du site, l'acquisition des terrains, la planification, les travaux d'ingénierie et les autorisations, la préparation du site, l'équipement et le matériel de terrassement, la construction de voies d'accès et de bâtiments et les diverses mesures de dépollution. D'autres facteurs contribuent aussi aux frais d'exploitation, dont la distance sur laquelle il faut transporter les déchets, la dotation en personnel, la surveillance, l'aménagement paysager, le renouvellement de l'équipement, les assurances, l'approvisionnement en matériau de recouvrement, la création de fonds en vue de la désaffectation des lieux et le dédommagement des propriétaires de terres voisines. Ainsi, le coût de la construction d'un lieu d'enfouissement moyen desservant une région urbaine peuvent s'élever à des dizaines de millions de dollars, sans compter les frais d'exploitation qui représentent, chaque année, des millions de dollars. Et, même après la désaffectation du lieu, la surveillance peut coûter des centaines de milliers de dollars par an. Sans parler des coûts entraînés par le nettoyage éventuel de dégâts. Un lieu d'enfouissement est une entreprise coûteuse !

Les redevances d'enfouissement

Les redevances sont les sommes que remettent les transporteurs de déchets à la municipalité ou au propriétaire du lieu d'enfouissement pour pouvoir y déverser des déchets. Les sommes ainsi recueillies peuvent être affectées au financement de l'installation. Elles peuvent également être versées dans un fonds de réserve pour la mise sur pied d'un programme municipal de réduction des déchets.

Il y a plusieurs façons de calculer les redevances par véhicule, la plus simple étant de fixer un tarif par véhicule, pour chaque chargement de déchets. On peut également établir le tarif selon le type de véhicule ou le volume du chargement. Certains lieux d'enfouissement exigent parfois des redevances plus élevées (jusqu'à deux fois le tarif normal) des non-résidents de la région desservie par l'installation.

Depuis 1987, les droits d'enfouissement pour les déchets industriels, commerciaux et institutionnels ont beaucoup augmenté. Dans la région du grand Toronto, par exemple, elles sont passées à 150 $ la tonne en 1991 et ce ne sera pas la dernière hausse. Certaines installations doublent parfois la redevance si le chargement contient des déchets recyclables ou d'autres substances interdites. Cependant, certaines petites villes hésitent à majorer les redevances par crainte de voir se multiplier les dépôts clandestins.

L'ENFOUISSEMENT DES DÉCHETS EN ONTARIO

L'Ontario possède environ 1 400 décharges en exploitation. De ce nombre, environ 45 p. 100 (630) desservent des collectivités qui comptent moins de 1 500 habitants; d'ailleurs, près de 10 p. 100 de la population ontarienne vit dans de telles collectivités. Le ministère des Richesses naturelles gère 350 lieux d'enfouissement (25 p. 100). Ces installations reçoivent les déchets des parcs provinciaux et autres installations de loisir établies sur les terres de la Couronne, des habitations saisonnières (des chalets, par exemple) et d'autres activités menées par ce ministère, le nettoyage qui suit les travaux de reboisement. Plusieurs des installations exploitées par le ministère des Richesses naturelles desservent également les résidents des régions rurales du nord de la province. Les 420 autres lieux d'enfouissement (30 p. 100) desservent des régions qui comptent plus de 1 500 habitants.

Que nous réserve l'avenir?

En Ontario, les lieux d'enfouissement seront bientôt remplis à capacité. On estime que, d'ici l'an 2000, ce sera le cas d'environ 250 des lieux présentement en exploitation. Cependant, plus de la moitié de la population ontarienne risque de ne pas avoir d'endroit où éliminer ses déchets bien avant cette date, soit en 1996, ceci en raison de la réduction graduelle de l'espace d'enfouissement due

L'emploi de cette méthode est fort répandu. En outre, de nombreux lieux d'enfouissement sont maintenant dotés de mécanismes de collecte des produits de lixiviation. Cependant, en raison de la complexité des mouvements de l'eau et de la structure du sol, on connaît mal l'efficacité des mesures d'atténuation du lixiviat. Par conséquent, le recours aux éléments naturels pour l'atténuation pose un grand danger pour l'environnement. Aussi ce procédé ne convient-il qu'aux lieux d'enfouissement de dimensions restreintes.

- ***La zone de saturation:*** cette méthode visant à retenir le lixiviat est conçue pour les installations qui ne se prêtent pas à l'atténuation naturelle. Il s'agit d'endroits où la surface de saturation est très élevée et où le sol est souvent saturé. On dépose les déchets sous la surface de saturation. Il faut d'abord placer au fond du lieu d'enfouissement une couche d'argile compacté d'au moins 15 à 20 m d'épaisseur. On prépare la glaise au préalable et on l'épand de manière à forcer le lixiviat à s'écouler vers l'intérieur du lieu d'enfouissement. Le liquide forme alors des mares dans le fond de la décharge et on peut le recueillir pour l'acheminer vers une usine d'épuration. Comme la pratique de l'enfouissement des déchets sous la surface de saturation n'est pas généralement admise, cette méthode de rétention du lixiviat n'est guère répandue.

- ***La couche de revêtement:*** jugées plus acceptables et donc plus répandues, les revêtements sont utilisés dans les lieux où le sol est perméable. Il s'agit de recouvrir d'un revêtement étanche le fond du lieu d'enfouissement. On peut employer un écran d'argile ou une toile synthétique appelée « géomembrane ». Pour éviter l'accumulation de lixiviat dans le fond du lieu d'enfouissement, on place un dispositif de collecte des produits de lixiviation juste au-dessus de la couche de revêtement. Un réseau de tuyaux perforés achemine ces liquides vers un ou plusieurs endroits sur le site. Un dispositif de drainage par gravité ou un réseau de pompes entraîne ensuite le liquide vers l'usine d'épuration.

Un certain nombre de lieux d'enfouissement en Ontario sont dotés d'un écran d'argile; ce sont surtout de grandes décharges aménagées dans des gravières en exploitation ou désaffectées, tel le lieu d'enfouissement Keele Valley, au nord de Toronto. Le ministère de l'Environnement exige cependant un plan de mesures d'urgence en cas de fuite.

L'utilisation d'un revêtement ou d'une toile en polyéthylène de haute densité n'est autorisée dans aucun lieu d'enfouissement de la province. Aux États-Unis, en revanche, on place parfois deux de ces toiles sur l'écran d'argile, pour une meilleure protection contre les fuites.

Le recours aux toiles synthétiques présente un avantage puisqu'il permet l'utilisation de mauvaises terres agricoles ou de carrières désaffectées. Cependant, cette méthode entraîne des coûts élevés (pour les dispositifs spécialisés de surveillance et de collecte du lixiviat) et exige un personnel spécialisé.

- ***La remise en état:*** on a recours à cette méthode pour améliorer des lieux d'enfouissement qui sont exploités depuis longtemps et qui, dans certains cas, ont contaminé les eaux de surface et les eaux souterraines. Il s'agit d'un système de déshydratation que vient compléter, dans plusieurs cas, un mur écran pour empêcher le lixiviat de quitter le lieu d'enfouissement. Le principe de la déshydratation est simple : on place un tuyau perforé dans une tranchée profonde creusée autour du lieu d'enfouissement et remplie de gravier. Les liquides s'écoulant du site sont ainsi captés et extraits en vue de leur traitement. On obtient des résultats semblables en forant de nombreux puits sur le périmètre du site pour extraire les eaux souterraines contaminées. La présence de murs écrans enfoncés profondément dans le sol pour restreindre l'écoulement du lixiviat améliore l'efficacité des systèmes de déshydratation. Pour construire ces murs, on creuse des tranchées profondes autour du lieu d'enfouissement et on les remplit d'argile ou d'un mélange d'argile, de ciment et d'autres matériaux semblables. Or, ces travaux, ainsi que l'entretien du mur écran, sont fort coûteux. Il s'avère souvent nécessaire d'extraire de grandes quantités d'eau contaminée devant ensuite être éliminée comme un effluent dangereux.

Réduction et surveillance des gaz

On peut réduire la dispersion des gaz provenant du lieu d'enfouissement tout comme on le fait pour les produits de lixiviation, c'est-à-dire à l'aide d'un écran. Il existe aussi des dispositifs complexes, qui, grâce à des tuyaux posés entre les couches de déchets, permettent d'évacuer les gaz et empêchent l'accumulation de pression différentielle. Dans certains cas, des pompes accélèrent ce processus. Dans les lieux d'envergure, il serait possible de récupérer le méthane qui pourrait servir de carburant ou de combustible.

La production de gaz

La décomposition provoque l'émission de gaz, dont le méthane, le dioxyde de carbone et le sulfure d'hydrogène. On sait également que les lieux d'enfouissement peuvent aussi dégager du sulfure d'hydrogène, du benzène et du chlorure de vinyle. L'émanation de gaz provenant d'un lieu d'enfouissement, même fermé, peut se poursuivre durant des siècles.

Les gaz contiennent des substances toxiques provenant des déchets enfouis qui risquent de tuer la végétation semée sur le site après sa désaffectation. Du reste, ils produisent des odeurs nauséabondes. Les effets que peuvent avoir ces gaz sur la santé des personnes vivant à proximité de lieux d'enfouissement n'ont pas encore fait l'objet de nombreuses études. Signalons, par ailleurs, que ces gaz peuvent s'infiltrer dans les maisons par les murs de la cave et s'y accumuler. Or, à des concentrations de 5 à 15 p. 100, le méthane risque de provoquer une explosion.

Les nuisances

En plus de poser des problèmes sur le plan écologique, les lieux d'enfouissement sont propices à d'autres nuisances : les goélands, les animaux nuisibles, les odeurs et les déchets sauvages. On peut toutefois atténuer leurs effets en recouvrant fréquemment les ordures et en érigeant dés barrières pour les retenir.

La circulation accrue de camions bruyants qui soulèvent des nuages de poussière et laissent tomber des déchets constitue également un problème. Pour le résoudre, on peut restreindre la circulation à certaines voies désignées, baisser la limite de vitesse, obliger les camionneurs à recouvrir leur chargement et exiger l'observation stricte des heures d'ouverture. Pour réduire le bruit émanant du lieu d'enfouissement, on peut ériger en périphérie de gros talus, appelés bermes.

Perte de terres agricoles

Malheureusement, bon nombre d'emplacements propices à l'aménagement de lieux d'enfouissement se trouvent sur d'excellentes terres agricoles. Ainsi, en plus de faire disparaître ces terres, le lieu d'enfouissement risque d'avoir des incidences négatives sur la collectivité environnante. Par exemple, la présence de nombreux camions peut entraver la circulation des engins agricoles et du bétail. Il ne faut pas non plus oublier le risque de contamination des eaux souterraines et des eaux de surface dont dépendent les activités agricoles. Cependant, si la conception, l'exploitation et la désaffectation du lieu sont effectuées comme il se doit, l'endroit peut servir par la suite à des fins agricoles.

LA PROTECTION DE L'ENVIRONNEMENT

De nombreuses mesures ont été établies pour atténuer les problèmes associés aux lieux d'enfouissement. De nos jours, les lieux d'enfouissement sont dotés de systèmes de surveillance pour éviter la contamination des eaux souterraines et des eaux de surface et veiller au bon fonctionnement du dispositif de collecte des gaz.

La surveillance du lixiviat

Les lieux d'enfouissement sont surveillés tout au long de leur vie utile et même après leur désaffectation et ce, pour s'assurer que les produits de lixiviation ne s'écoulent pas à l'extérieur du site. Pour analyser les eaux souterraines, on creuse des puits à proximité du lieu d'enfouissement après avoir soigneusement étudié la géologie du sol. On peut également recueillir le lixiviat sur place au moyen de tuyaux placés au fond du lieu d'enfouissement. Ces tuyaux peuvent se déverser dans des bassins de décantation faisant partie des installations d'épuration ou mener directement au réseau d'égouts, qui est relié à l'usine d'épuration municipale.

Or, au cours des vingt dernières années, on a perfectionné l'aménagement des lieux d'enfouissement de manière à prévenir l'écoulement du lixiviat. On a recours, par exemple, à l'atténuation naturelle, à une zone de saturation, à une couche de revêtement et à la remise en état des lieux.

- ***L'atténuation naturelle:*** cette méthode fait usage de la nature du sol pour « atténuer » ou éliminer les contaminants du lixiviat à mesure que celui-ci s'infiltre dans les déchets enfouis. Le mécanisme d'atténuation dépend des caractéristiques propres au sol et peut comprendre diverses réactions chimiques naturelles, dont la filtration et la dégradation. Il doit toutefois y avoir, entre la couche inférieure de déchets et la surface de saturation, une couche épaisse de limon et d'argile.

Le sur-remplissage

Pour accroître la capacité d'un lieu d'enfouissement, on utilise le plus souvent la méthode qui consiste à y déposer davantage de déchets ou de matière de recouvrement que prévu sans toutefois outrepasser les limites du site. En accélérant ainsi le tassement, on peut alors excéder la capacité d'enfouissement sans modifier la hauteur et l'étendue de l'installation. Ce procédé ne permet cependant qu'une faible augmentation de la capacité. En outre, les quantités de terre requises pour le recouvrement sont considérables.

Le broyage et l'emballage

Le broyage des déchets solides consiste à les déchiqueter en petits morceaux. Pour emballer les déchets, on les compresse pour en former des balles rectangulaires et denses. Ni l'une ni l'autre de ces méthodes n'est présentement utilisée en Ontario. On affirme cependant qu'elles permettent d'accroître la densité des déchets enfouis, de réduire la couche de recouvrement quotidienne et de diminuer les problèmes de déchets sauvages, d'odeurs et de nuisances. En général, ces deux méthodes améliorent l'aspect du lieu d'enfouissement.

Parmi les inconvénients de ces deux techniques citons les dépenses en immobilisations et d'exploitation, qui sont très élevées, l'espace nécessaire à l'équipement et aux installations et les pannes fréquentes. En outre, cette technologie ne s'applique pas de façon universelle, car on ne peut tout broyer et emballer. Certains déchets doivent donc être traités autrement.

L'extraction des déchets

Il est possible de déterrer des déchets enfouis afin de récupérer les matières recyclables et le sol organique qui servira au recouvrement. Ceci libère d'ailleurs de l'espace pour l'enfouissement d'autres déchets. Il s'agit là d'un procédé inédit au Canada. Quelques essais ont cependant été effectués aux États-Unis. L'extraction des déchets semble réussir dans les climats chauds, où la décomposition est rapide. Les économies réalisées sur la matière de recouvrement contrebalancent les coûts de l'excavation, mais cette méthode est dangereuse et présente des risques d'explosion et d'autres répercussions. En outre, les travaux peuvent être bruyants et nauséabonds. Il ne s'agit donc pas d'une pratique désirable pour le prolongement, à court terme, de la vie utile d'un lieu d'enfouissement.

Recouvrement synthétique quotidien

Il existe un procédé relativement nouveau qui consiste à recouvrir d'une substance synthétique les déchets compactés et épandus dans une alvéole.

Le recouvrement synthétique -- mousse d'urée-formaldéhyde -- est beaucoup moins volumineux que la terre. Il permet donc d'entreposer davantage de déchets. Nous disposons à ce jour de très peu de renseignements sur la toxicité de cette substance et ses effets sur la qualité du lixiviat et sur les environs du lieu d'enfouissement. La mousse présente également des inconvénients manifestes : elle est lessivée par la pluie et peut, lorsqu'elle est sèche, être emportée par le vent. Par temps froid, il faut l'activer à l'aide d'eau tiède. De plus, la mousse n'éloigne pas les oiseaux, ni les rongeurs ni les insectes.

LES PROBLÈMES ENVIRONNEMENTAUX

Certains problèmes environnementaux sont liés aux lieux d'enfouissement, notamment la lixiviation, la production de gaz, les nuisances et la perte de terres agricoles.

La lixiviation

Tous les lieux d'enfouissement produisent de l'eau contaminée qu'on appelle lixiviat. Il s'agit, en fait, de pluie ou de neige fondue qui, s'étant infiltrée dans les déchets, emporte des matières dissoutes. Or, ces produits de lixiviation peuvent ensuite contaminer les eaux de surface ou les eaux souterraines. Les matières organiques transportées par le lixiviat peuvent accélérer le vieillissement naturel ou l'eutrophisation des lacs. Le lixiviat peut également contenir d'autres substances toxiques, tels les métaux lourds. Comme l'acidité de l'eau favorise la dissolution des métaux, plus la pluie ou la neige est acide, plus le lixiviat contient de métaux lourds.

tranchée aussi loin que l'espace le permet. Des camions portent les déchets jusqu'au bord du fossé, puis y déversent leur chargement. Un bulldozer, qui reste dans le fossé, procède ensuite au compactage. À la fin de la journée, on recouvre les déchets d'une couche de terre provenant de l'excavation de la tranchée ou de tranchées avoisinantes. Dès qu'un fossé est rempli, on en creuse un autre à côté. Toutes les tranchées sont indépendantes les unes des autres.

Ce mode de remblayage convient surtout à l'enfouissement de petites quantités de déchets et de déchets spéciaux, tels les boues, les déchets de bois et les décombres. Il produit moins de gaz et de lixiviat par tonne de déchets que les autres modes d'enfouissement. En outre, ce genre de remblayage facilite la réduction des déchets sauvages. Autre avantage : le remblayage en tranchées ne produit pas les talus caractéristiques du remblayage en surface. Les tranchées font toutefois une utilisation moins efficace de l'espace puisqu'il doit y avoir un intervalle entre chacune.

- ***Le remblayage en surface modifié:*** dans ce cas, on creuse une alvéole ou une rangée d'alvéoles, en mettant de côté les déblais qui serviront à recouvrir quotidiennement les déchets. Les camions transportant les déchets entrent dans l'alvéole et déversent leur chargement contre le mur arrière légèrement incliné. On effectue alors le compactage en remontant la pente. L'aménagement d'alvéoles additionnelles se fait selon un procédé semblable à celui du remblayage en surface.

On a davantage recours à cette méthode de remblayage qu'aux deux autres dans des installations de grande envergure, c'est-à-dire là où l'on achemine plus de 180 tonnes de déchets par jour. Cette méthode offre plus de souplesse et permet d'utiliser toutes les techniques décrites ci-dessus. En fait, de nombreuses installations, d'abord conçues pour le remblayage en tranchées, sont converties par la suite en ce genre de site. Comme c'est le cas pour le remblayage en tranchées, les déchets sont habituellement enfouis sous terre. Signalons toutefois les dépenses en immobilisations particulièrement élevées qu'occasionnent ces lieux d'enfouissement et le fait qu'il s'y produit plus de lixiviat et de gaz que dans les tranchées.

Les zones tampon

De nos jours, les lieux d'enfouissement doivent être entourés d'un espace qui ne peut servir ni à l'enfouissement de déchets ni à l'aménagement urbain (logements, écoles, centres commerciaux et industries). Cette zone de protection, ou zone tampon, sert à minimiser les incidences du site sur les terres avoisinantes, notamment les odeurs, le bruit, la poussière et les déchets sauvages. Cette zone tampon peut mesurer entre 30 et 500 mètres de largeur, selon les dimensions du lieu d'enfouissement.

L'équipement et les installations

Le type de machinerie lourde employée dépend de l'envergure du site (bulldozers, compacteurs, décapeuses, chargeuses, niveleuses, par exemple). Le lieu d'enfouissement doit également être doté de voies d'accès et de routes internes, d'édifices administratifs et de bascules servant à peser les camions à l'arrivée. La protection de l'environnement exige par ailleurs la construction d'installations de traitement des produits de lixiviation et l'aménagement de bermes pour contenir le bruit. Ces installations sont décrites plus loin.

Dans certaines municipalités, les lieux d'enfouissement sont situés à une grande distance des points de collecte. Des stations de transfert peuvent alors s'avérer nécessaires. On y effectue le compactage des déchets, que des camions transportent périodiquement au lieu d'enfouissement. On réduit ainsi le nombre de camions devant effectuer le trajet jusqu'à l'installation principale, tout en diminuant les frais de transport et les répercussions sur la localité.

AUGMENTER LA CAPACITÉ DU LIEU D'ENFOUISSEMENT

On compacte habituellement les déchets pour pouvoir en enfouir une plus grande quantité dans un espace donné. Or, au fil des ans, les remblais se tassent à mesure que les déchets se consolident, s'affaissent et se décomposent. On peut cependant recourir à diverses méthodes pour accélérer ce processus et augmenter l'espace utilisable.

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L'ENFOUISSEMENT DES DÉCHETS

Chaque année, la population et les industries ontariennes produisent environ 10 millions de tonnes de déchets solides. Environ 40 p. 100 de ces déchets proviennent du secteur résidentiel, tandis que le reste (60 p. 100) est produit par les secteurs industriel, commercial et institutionnel (ICI). En 1989, la dernière année pour laquelle nous possédons des données exhaustives, près de 90 p. 100 des déchets produits en Ontario étaient déposés dans les 1 400 lieux d'enfouissement de la province. Certains de ces lieux sont la propriété des municipalités qui les exploitent; d'autres relèvent du secteur privé.

Bien que de nombreuses collectivités aient mis en oeuvre des programmes fort efficaces de réduction des déchets ou d'application des 3 « R » (réduire, réutiliser, recycler), le reste des déchets doit encore être acheminé vers des lieux d'enfouissement. L'endroit idéal pour l'aménagement d'un lieu d'enfouissement est un terrain à fond argileux qui aidera à prévenir la contamination des eaux souterraines. Lorsqu'il est rempli à capacité, on le recouvre d'un couche épaisse de terre, puis on y plante de la végétation. Si le lieu d'enfouissement est bien conçu et géré judicieusement, on peut alors le réutiliser à des fins récréatives. Toutefois, même après sa fermeture, le lieu d'enfouissement exige une surveillance aussi étroite que durant son exploitation, afin de dépister tout risque possible pour l'environnement. Il faut se rappeler que les déchets qui y sont enfouis le demeureront à perpétuité.

LA CONCEPTION DES LIEUX D'ENFOUISSEMENT

Méthodes d'enfouissement

Un lieu d'enfouissement n'est pas tout simplement un trou dans le sol où l'on entasse pêle-mêle des ordures. Au contraire, l'enfouissement de déchets s'effectue dans des conditions rigoureuses. Il existe trois grandes méthodes : le remblayage en surface, le remblayage en tranchées et le remblayage en surface modifié.

- ***Le remblayage en surface:*** on prépare d'abord la surface d'un terrain, puis des camions y apportent les déchets, qui sont alors épandus et compressés par un bulldozer en couches d'environ 40 à 75 cm. À la fin de chaque jour, et dès que les déchets compactés atteignent une hauteur de trois mètres, on recouvre le tout de 15 cm de matière inerte (habituellement de la terre).

La section ainsi remblayée, y compris la matière de recouvrement, s'appelle une « alvéole ». Dès qu'une alvéole est remplie et recouverte, on en amorce une autre. Puis, lorsque la première rangée d'alvéoles est remplie, on recommence par-dessus.(L'alvéole remplie de déchets située au-dessus d'une autre s'appelle « surélévation ».) On procède ainsi jusqu'à ce que le remblai atteigne la hauteur maximale autorisée.

Cette méthode de remblayage nécessite de grandes étendues de terrain peu accidenté ou onduleux, mais elle permet d'enfouir des quantités énormes de déchets. Toutefois, il faut d'abord les compacter afin de tirer pleinement profit de l'espace disponible. Ces lieux d'enfouissement présentent cependant des inconvénients : ils occupent de vastes étendues de terrain, exigent de grandes quantités de matériel de recouvrement devant parfois être apporté de l'extérieur et leur aménagement est coûteux.

- ***Le remblayage en tranchées:*** cette méthode consiste à compacter les déchets et à les épandre dans une tranchée profonde de 9 mètres et large de 30 mètres au maximum. On peut prolonger la

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INCINERATION OF GARBAGE

Incineration is the controlled burning of wastes to reduce their volume and in some cases to recover energy from the incinerated waste. On average, a municipal solid waste (MSW) incinerator leaves a residue of about one-third of the original waste. This residue, in the form of bottom and fly ash, often contains many toxic substances. In addition to garbage, different types of incinerators may be used to burn biomedical and hazardous wastes.

Ontario has five existing garbage incinerators and one approved facility nearing completion. About 400,000 tonnes per year of garbage is burned. That's nearly four per cent of all solid waste from residential, commercial, industrial and institutional sources combined. Since April, 1991, the construction of new garbage incinerators has been banned because of various environmental problems associated with incineration and their incompatibility with waste reduction programs.

INCINERATION TECHNOLOGIES

For large scale plants, handling 300 tonnes of waste a day or more, wastes are usually deposited in a storage pit where a crane grapple loads the furnace feed hopper. Small scale plants, handling less than 300 tonnes a day, generally use a large tipping floor, and a front-end loader fills the feed hopper.

Mass Burn

Mass burn incineration plants generally incinerate wastes in a one-stage operation. There is no prior processing except for the removal of large, bulky, non-combustible or explosive wastes. Some mass-fired plants can handle more than 3,000 tonnes per day. There are approximately 400 plants worldwide with a total capacity of about 200,000 tonnes per day. Mass burn systems are used in the Greater Vancouver Regional District, British Columbia, and in Quebec City.

Modular

Modular incinerators involve a two-stage operation. They have a primary chamber and a secondary chamber. Waste is placed into the primary chamber and burned. The gases produced in the primary chamber by the combustion process are then burned in the secondary chamber. This approach reduces the amount of waste gases to be controlled as compared to the one-stage mass burn process. Examples of modular units include the energy from waste (EFW) plants in Charlottetown, P.E.I., London, and Brampton, Ontario.

Semi-suspension

Semi-suspension systems consist of a furnace which allows fuel to be injected to help the burning process. These systems require shredding of materials and removal of non-combustible materials before incineration. An example is a facility in Hamilton, Ontario.

Fluid Bed

Fluid bed incineration is the combustion of wastes in a bed of material, usually sand or a mixture of sand and limestone which has been "fluidized" by the injection of heated air at the bottom of the bed. Fluidized bed incinerators are generally noted for their ability to accept a wide range of fuels or mixtures of fuels.

Pyrolysis

Pyrolysis is the process of disposing of organic garbage without using air (oxygen) but by using heat. With this type of system it is usually better to shred the waste to provide a uniform feed size for the pyrolysis reactor. Applying heat distils the waste into carbon products consisting of carbon gases and a charcoal residue. The condensable gases may be collected in a storage tank to be burned later, converted to chemical products or treated and discharged. The non-condensable gases which are not used to heat the pyrolytic reactor are normally used as a fuel for energy recovery.

Although pyrolysis systems have been built, there are no commercial facilities operating in North America. Problems have been found with fuel processing, combustion and poor quality emissions.

ENERGY FROM WASTE

Some incinerators, called energy from waste (EFW) plants, generate energy in the forms of steam, electricity and hot water. This means harnessing the escaping heat from the combustion process and channelling it into something practical such as warming a building. EFW plants burn paper, wood, vegetation, plastics, rubber and other wastes. In practice, energy recovery is often needed to try to make an incineration plant economically viable.

Plants that separate and recover material before incineration may produce waste pellets that can be sold elsewhere as a fuel. Such plants are referred to as refuse derived fuel (RDF) production plants. EFW plants can be designed to burn RDF or RDF in combination with other fuels such as coal.

ENVIRONMENTAL CONTROLS

Fabric filters

Also known as baghouses, fabric filters are commonly used in industry to filter particles which flow from the incineration process. Waste gases pass through these permeable bags. Periodically, the bags must be cleaned by shaking them mechanically or by reversing the air flow removing the accumulated particles, which are collected for landfill disposal or recycling.

Cyclones

Cyclones are also commonly used in industry to control particles. Cyclones transform the incoming gas stream into a double vortex. The gas spirals downward in the outer part of the cyclone and upward in the inner part. The particles in the gas stream move to the outer part of the cyclone and spiral downward to an outlet, where they are collected for landfill disposal or recycling.

Gas scrubbers

Gas scrubbers are used to remove the gaseous components and particles of the incinerator emissions. Various wet and dry scrubbing systems are available. A wet or dry chemical agent is used to bond with or react to the gases to form small solid particles. In many cases, acid gases are neutralized. Other gases may be captured. Wet processes usually make it necessary to treat the wastewater before discharge to the sewage system. Dry scrubbers generate a solid waste which requires landfill disposal or recycling.

Electrostatic Precipitators

Electrostatic precipitators send an electric charge between plates that attracts particles in the stack. By themselves, electrostatic precipitators cannot meet current emission standards since their purpose is specifically to remove solid particulate matter in the gas stream. A state-of-the-art emission control system would consist of a gas scrubber in combination with a fabric filter.

ENVIRONMENTAL PROBLEMS

Air emissions

Even with the newest emission controls, all incinerators release pollutants. The pollutants vary according to the type of garbage burned. They can include nitrogen oxide, sulphur dioxide, hydrogen chloride, metals and organics such as dioxins and furans. Some of these pollutants contribute to global warming; many are toxic. Eventually, they settle in soil and water, adding to the cumulative toxic load on the environment, which can have a detrimental effect on human health.

Very little is currently known about the health risks presented by incineration. Air emission tests usually have been conducted on new facilities operating at peak performance. There is little data available on how incinerators perfom under the full range of operating conditions. Emissions may also vary considerably over time because of the makeup of the waste stream is not always the same. High concentration of plastics, solvents or other highly volatile materials will result in surges in toxic emissions.

Incinerator solid wastes

Incineration does not make the garbage disappear. The burning process creates bottom ash and fly ash. Bottom ash is the material that doesn't burn and is left at the bottom of the incinerator after all combustible materials are gone. Fly ash is the material trapped by the environmental controls in the stack. These ashes form a substantial amount – 25 to 40 per cent by weight – of the original quantity put into the incinerator. In Ontario, fly ash must be tested and if it is toxic it must be treated or disposed of in a special hazardous waste landfill. Bottom ash need not be tested and can be disposed of in a landfill site. Toxic metals such as mercury, copper, lead, zinc and cadmium have been found in ash. Excess amounts of these toxics can create health problems.

- Mercury damages the central nervous system.
- Copper dust can irritate the nose and upper respiratory tract.
- Lead can cause high blood pressure and nerve damage.
- Zinc dust can cause coughing, fever and muscular aches.
- Cadmium can cause kidney damage. It is known to cause birth defects in animals.

Nuisances

Heavy truck traffic can become concentrated in areas near an incinerator due to the large amount of garbage needed to make the plant viable. Noise and odours from incinerator operations also may be a nuisance for the community.

ECONOMICS OF INCINERATION

Garbage incinerators are expensive to build and operate. A plant handling between 300 and 400 tonnes a day would cost about $50 million to build, and about $65 to $70 a tonne to operate. A plant handling 3,000 tonnes a day would cost more than $1 billion, and about $40 to $50 a tonne to operate.

Several factors contribute to capital and operating costs of incineration facilities.

- Number and size of incinerators, boilers and flue
- gas cleaning devices
- Trucking of solid waste to the site and ash from the site
- Staffing requirements
- Land and buildings
- Ash disposal
- Recovery of recyclable materials prior to incineration
- Recovery of heat from the incineration process
- Air pollution control equipment
- Repair and maintenance

COMPATIBILITY WITH THE 3RS

Incineration is not compatible with the Ministry of the Environment's waste management strategy that encourages Ontario's citizens to adopt the principles of a "conserver society." Through policies and programs based on the 3Rs (reduce, reuse and recycle), the ministry promotes widescale waste diversion from disposal in the province's residential, industrial, commercial and institutional sectors. With these programs, the Ontario government expects to meet its waste reduction targets of 25 per cent in 1992 and 50 per cent by the year 2000. Incineration is not compatible with this strategy for a number of reasons:

- Instead of reducing waste production, incineration demands a constant supply of garbage to be economically viable. For large incinerators, 3,000 tonnes per day are needed to make the plant profitable, even if it means shipping garbage in from other places. Recycling and incineration compete for the same materials in the waste stream. The recycling of materials such as paper and wood may mean that the remaining waste stream has insufficient heating value to support incineration.

• Some of the incinerated wastes includes valuable materials that could be recycled. This in turn, hurts the economic viability of recycling programs, such as the Blue Box.

• The large amount of money that is spent to build and operate incinerators takes away financial resources that could be put towards the more environmentally sound approach of 3Rs programs.

• Incineration removes incentives for manufacturers to reduce excess packaging and to make products which are reusable and recyclable.

• Even when incinerators produce energy as a by-product, this is a very inefficient process. More energy can be saved by recycling materials than by burning them. Solid waste is not a very good fuel, partly because it is often too wet and because of extreme variations in composition.

• The disposal of hazardous fly ash in landfills contributes to the stockpile of toxic wastes which already exists and degrades our environment.

• Incineration competes with the development of new environmentally responsible "green" technologies and materials.

GARBAGE INCINERATION BAN IN ONTARIO

In April 1991, Ontario Minister of the Environment, Ruth Grier, announced a ban on the construction of new garbage incinerators in Ontario. The ban does not affect the province's five existing garbage incinerators and one approved facility near completion. However, the Ministry of the Environment is reviewing the Certificates of Approvals and monitoring requirements for these facilities. The incineration of biomedical waste, wood and hazardous waste, as well as the burning of untreated wood continues to be permitted but is being reviewed as a disposal option.

For more information on waste issues contact:

Environment Ontario
Public Information Centre
Telephone: (416) 323-4321
1-800-565-4923
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

PIBS #1827
01/92

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L'INCINÉRATION ET L'APPLICATION DES 3 « R »

L'incinération va à l'encontre des efforts de gestion des déchets déployés par le ministère de l'Environnement en vue d'encourager les citoyennes et les citoyens de l'Ontario à adopter les principes d'une société de conservation. Par l'entremise de politiques et de programmes fondés sur l'application des 3 « R » (réduire, réutiliser, recycler), le Ministère fait valoir la réduction des déchets dans les secteurs résidentiel, industriel, commercial et institutionnel de l'Ontario. Le gouvernement espère ainsi atteindre ses objectifs en matière de réduction des déchets, soit le réacheminement d'au moins 25 p. 100 des déchets normalement destinés à l'enfouissement en 1992 et d'au moins 50 p. 100 d'ici l'an 2000. L'incinération n'est pas compatible avec cette stratégie pour de nombreuses raisons :

- Les incinérateurs nécessitent pour être rentables un apport constant en déchets. Les gros incinérateurs requièrent 3 000 tonnes de déchets par jour pour fonctionner à pleine capacité, même si cela implique qu'il faut aller chercher des déchets à l'extérieur de la région.
- L'incinération fait concurrence au recyclage, car elle utilise aussi les matières recyclables qui pourraient se trouver dans le flux de déchets. Le recyclage de matières telles que le papier et le bois enlève aux incinérateurs un de leurs meilleurs combustibles.
- Certains déchets incinérés sont des matières qui pourraient être recyclées. Cet aspect de l'incinération nuit à la viabilité économique des programmes de recyclage comme celui de la boîte bleue.
- Les sommes considérables qu'engloutissent la construction et l'exploitation des incinérateurs seraient utilisées plus sagement si elles étaient investies dans des programmes d'application des 3 « R », qui tiennent compte des impératifs environnementaux.
- L'incinération n'encourage pas l'industrie à éviter de suremballer ses produits et à fabriquer des produits réutilisables et recyclables.
- Même si certains incinérateurs réutilisent une partie de l'énergie dégagée lors de la combustion des déchets, ce processus n'est pas très efficace. Le recyclage des matières contribue davantage à l'économie d'énergie que l'incinération. Les déchets solides ne font pas de très bons combustibles : ils sont souvent trop humides et très hétérogènes.
- L'élimination des envols augmente le fardeau imposé à l'environnement par les lieux d'enfouissement de déchets dangereux.
- L'incinération des déchets entre en compétition avec les efforts déployés pour mettre au point des technologies et des produits écosympathiques.

L'INTERDICTION DE CONSTRUIRE DE NOUVEAUX INCINÉRATEURS EN ONTARIO

En avril 1991, Mme Ruth Grier, ministre de l'Environnement de l'Ontario, interdisait la construction de nouveaux incinérateurs en Ontario. L'interdiction ne touche pas les cinq incinérateurs déjà en exploitation dans la province, ni celui dont la construction est presque terminée. Cependant, le ministère de l'Environnement a entrepris de réviser les certificats d'autorisation et les exigences de la surveillance qui s'appliquent à ces installations. L'incinération de déchets biomédicaux, de bois, de déchets dangereux et de bois non traité est encore permise, mais sa validité est remise en question.

Pour obtenir plus de renseignements sur la gestion des déchets, s'adresser à :

Environnement Ontario
Centre d'information
135, avenue St. Clair ouest
Toronto (Ontario) M4V 1P5

Téléphone : (416) 323-4321
1-800-565-4923

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PROBLÈMES ENVIRONNEMENTAUX

Pollution atmosphérique

Même s'ils sont dotés des dispositifs antipollution les plus récents, les incinérateurs sont une source de pollution atmosphérique. Les polluants rejetés varient selon le type de déchets incinérés. Ils peuvent comprendre l'oxyde d'azote, le dioxyde de soufre, le chlorure d'hydrogène ainsi que des métaux et des polluants organiques comme les dioxines et les furannes. Certains de ces polluants contribuent au réchauffement du globe et beaucoup d'entre eux sont toxiques. Quand ils retombent au sol ou dans les cours d'eau, ils augmentent la charge en substances toxiques de l'environnement et présentent un risque pour la santé.

Très peu de données nous permettent à l'heure actuelle de déterminer les effets de l'incinération sur la santé. Des analyses ont été effectuées sur des nouvelles installations fonctionnant à plein rendement, mais très peu de données ont été recueillies sur les émissions des incinérateurs dans d'autres conditions de fonctionnement. En effet, les émissions peuvent varier considérablement d'une fois à l'autre en raison de la grande diversité des déchets mis à incinérer. Par exemple, si les déchets comprennent un fort pourcentage de matières plastiques, de solvants ou d'autres substances très volatiles, la toxicité des émissions sera beaucoup plus élevée.

Résidus solides de l'incinération

L'incinération ne détruit pas complètement les déchets. Les résidus de combustion comprennent des cendres lourdes et des envols. Les cendres lourdes sont les résidus non combustibles qui restent au fond de l'incinérateur après que toutes les matières combustibles aient brûlé. Les envols sont les résidus récupérés par les dispositifs antipollution de la cheminée. Ces cendres représentent une proportion relativement importante — de 20 à 40 p. 100 — du poids total des déchets incinérés. En Ontario, les envols doivent être analysés avant d'être éliminés. S'ils sont toxiques, ils doivent être éliminés dans un lieu d'enfouissement pour déchets dangereux. Il n'est pas nécessaire d'analyser les cendres lourdes; elles peuvent être éliminées dans un lieu d'enfouissement ordinaire. Les cendres contiennent parfois des métaux toxiques comme le mercure, le cuivre, le zinc, le plomb et le cadmium. Des concentrations élevées de ces métaux peuvent présenter un risque pour la santé, par exemple :

- le mercure cause des lésions au système nerveux central;
- la poussière de cuivre peut irriter le nez et les voies respiratoires supérieures;
- le plomb peut entraîner l'hypertension artérielle et des lésions nerveuses;
- la poussière de zinc peut entraîner la toux, la fièvre et des douleurs musculaires;
- le cadmium peut causer des lésions rénales. Des essais sur les animaux ont révélé qu'il causait des malformations congénitales.

Nuisances

L'exploitation d'un incinérateur risque d'entraîner une nette augmentation de la circulation de camions dans la région immédiate, car les incinérateurs requièrent d'importantes quantités de déchets pour être rentables. De plus, le bruit et les odeurs peuvent incommoder les résidents des environs.

LES FACTEURS ÉCONOMIQUES DE L'INCINÉRATION

Les coûts de construction et d'exploitation des incinérateurs sont très élevés. La construction d'un incinérateur d'une capacité de 300 à 400 tonnes par jour coûterait 50 millions de dollars et les frais d'exploitation seraient de 65 à 70 $ par tonne de déchets incinérés. Un incinérateur d'une capacité de 3 000 tonnes de déchets par jour coûterait plus d'un milliard de dollars à construire et ses frais d'exploitation seraient de 40 à 50 $ par tonne.

Plusieurs facteurs contribuent à l'augmentation des dépenses en immobilisations et des coûts d'exploitation des incinérateurs :

- le nombre de fours, de chaudières et de dispositifs d'épuration des gaz de combustion et leurs dimensions;
- les frais de transport des déchets jusqu'à l'incinérateur et de transport des cendres jusqu'au lieu d'enfouissement;
- la main-d'oeuvre;
- l'acquisition des terrains et des bâtiments;
- les frais d'enfouissement des cendres;
- la récupération des matières recyclables avant l'incinération;
- la récupération de l'énergie thermique issue de l'incinération;
- les dispositifs antipollution;
- la réparation et l'entretien.

Incinérateurs à lit fluidisé

Dans ce système, les déchets sont brûlés sur un lit de matières, généralement un mélange de sable et de pierre à chaux, qui ont été fluidisés par l'injection d'air chaud au fond du lit. Les incinérateurs à lit fluidisé présentent l'avantage d'accepter une grande variété de matières, une vaste gamme de combustibles et différents mélanges de combustibles.

Incinérateurs à pyrolyse

La pyrolyse est un procédé qui permet d'éliminer les déchets organiques sous l'effet de la chaleur, mais en l'absence d'air (oxygène). Dans ce procédé, il est préférable de déchiqueter les déchets afin d'alimenter le réacteur de façon homogène. La chaleur carbonise les déchets et les transforme en différents gaz carboniques et en résidus de charbon. Les gaz condensables peuvent être récupérés dans un réservoir pour ensuite être brûlés, convertis en produits chimiques ou traités puis éliminés. Les gaz non condensables qui ne sont pas utilisés pour alimenter le réacteur sont utilisés comme combustible à des fins de récupération d'énergie.

Bien que des incinérateurs à pyrolyse aient été construits, aucune installation commerciale de ce type n'est actuellement en exploitation en Amérique du Nord. Il semble en effet que ce type d'installation soit moins que parfait. Le traitement des combustibles, la combustion et la piètre qualité des émissions posent certains problèmes.

TRANSFORMATION DES DÉCHETS EN ÉNERGIE

Certains incinérateurs, appelés usines de transformation des déchets en énergie, utilisent les déchets pour produire de la vapeur, de l'électricité et de l'eau chaude. Ces usines récupèrent la chaleur produite lors de la combustion des déchets et l'utilisent pour chauffer un édifice par exemple. Les usines de transformation des déchets en énergie incinèrent des matériaux aussi divers que le papier, le bois, les matières végétales, les plastiques et le caoutchouc. Généralement, la récupération d'énergie est nécessaire à la viabilité d'un incinérateur. Les usines qui font le tri et la récupération des matières avant l'incinération peuvent produire des pastilles de déchets et les vendre comme combustible. Il s'agit d'usines de production de combustibles obtenus à partir de déchets. Les usines de transformation des déchets en énergie peuvent être conçues pour brûler uniquement des combustibles obtenus à partir de déchets, ou brûler ceux-ci en combinaison avec d'autres combustibles, comme le charbon.

DISPOSITIFS ANTIPOLLUTION

Séparateurs à tissus filtrants

Aussi connus sous le nom de dépoussiéreurs à sacs filtrants, les séparateurs à tissus filtrants sont utilisés couramment dans les incinérateurs pour récupérer les particules dégagées par la combustion. Les sacs perméables, à travers desquels on fait passer les gaz de combustion, doivent être nettoyés périodiquement en les agitant mécaniquement ou en créant un courant d'air inverse qui délogera les particules emprisonnées. Ces résidus sont par la suite éliminés par enfouissement ou recyclage.

Cyclones

Les cyclones sont aussi utilisés couramment dans l'industrie pour éliminer les particules produites lors de la combustion des déchets. Ils créent un tourbillon double dans le courant gazeux affluent et font décrire aux gaz une spirale descendante à l'extérieur du cyclone et une spirale ascendante en son centre. Ce système permet d'entraîner les particules vers l'extérieur et de les aspirer ensuite dans le centre vers un collecteur. Les particules recueillies sont éliminées par enfouissement ou recyclage.

Épurateurs de gaz

Les épurateurs de gaz ont pour fonction d'éliminer les particules et les gaz émis lors de la combustion des déchets. Il existe plusieurs systèmes d'épuration des gaz par voie sèche ou par voie humide. Ils utilisent un agent chimique qui se combine ou réagit avec les gaz pour former des petites particules solides. Dans beaucoup de cas, les gaz acides sont neutralisés; d'autres gaz peuvent être captés. Le procédé d'épuration par voie humide requiert le traitement des eaux usées avant qu'elles ne soient déversées dans les égouts. Le procédé d'épuration par voie sèche produit des résidus solides qui doivent être enfouis ou recyclés.

Précipitateurs électrostatiques

Les précipitateurs électrostatiques créent un fort courant électrique entre deux plaques, permettant de capter les particules dans la cheminée de l'incinérateur. Ce type de système ne constitue pas une mesure antipollution suffisante, car il n'élimine que les matières particulaires solides du flux gazeux.

Un séparateur à tissus filtrants utilisé conjointement avec un épurateur de gaz constituerait un système antipollution efficace.

ENVIRONMENT INFORMATION - ENVIRONNEMENT

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L'INCINÉRATION DES DÉCHETS

L'incinération des déchets est un procédé d'élimination par combustion contrôlée qui vise à réduire le volume des déchets et, dans certains cas, à récupérer une partie de l'énergie dégagée lors du procédé. Généralement, les incinérateurs municipaux produisent un résidu d'incinération représentant le tiers du volume des déchets brûlés. Ce résidu — les cendres lourdes et les cendres volantes ou envols — contient souvent un grand nombre de substances toxiques. D'autres types d'incinérateurs sont aussi utilisés pour brûler les déchets biomédicaux et les déchets dangereux.

Cinq incinérateurs sont actuellement en exploitation dans la province et une installation est en voie de construction. Chaque année, l'Ontario incinère environ 400 000 tonnes de déchets, soit près de quatre p. 100 de tous les déchets solides provenant des secteurs résidentiel, commercial, industriel et institutionnel. Depuis avril 1991, la construction de nouveaux incinérateurs a été interdite en Ontario en raison des divers problèmes environnementaux qu'elle pose et de l'incompatibilité de cette activité avec les objectifs des programmes de réduction des déchets.

TYPES D'INCINÉRATEURS

Dans les gros incinérateurs, d'une capacité de 300 tonnes de déchets ou plus par jour, les déchets sont habituellement déposés dans une fosse avant d'être mis dans le four au moyen d'un grappin. Les petits incinérateurs, dont la capacité est de moins de 300 tonnes de déchets par jour, sont généralement dotés d'une plate-forme basculante et d'une chargeuse frontale qui remplit de déchets la trémie de chargement.

Incinérateurs de déchets non conditionnés

Les incinérateurs de déchets non conditionnés brûlent habituellement les déchets en une seule étape. Les déchets ne sont soumis à aucun traitement préalable, mais on en retire les matières trop encombrantes, non combustibles ou explosives. Certains incinérateurs de déchets non conditionnés ont une capacité de plus de 3 000 tonnes de déchets par jour. Il existe environ 400 incinérateurs de ce genre au monde, soit une capacité totale d'environ 200 000 tonnes par jour. Le district régional du grand Vancouver (Colombie-Britannique) et la ville de Québec utilisent des incinérateurs de déchets non conditionnés.

Incinérateurs modulaires

Les incinérateurs modulaires brûlent les déchets en deux étapes. Ils sont dotés d'une chambre de combustion primaire et d'une chambre de combustion secondaire. Les déchets sont d'abord placés dans la chambre primaire où ils sont incinérés. Les gaz de combustion produits dans la chambre primaire sont ensuite brûlés dans la chambre secondaire. Cette méthode permet de réduire les quantités de gaz qui doivent êtres traités avant d'être rejetés dans l'atmosphère. On retrouve de tels incinérateurs dans les usines de transformation des déchets en énergie de Charlottetown (Î.-P.-É.), de London et de Brampton (Ontario).

Incinérateurs à injection

Ces incinérateurs consistent en un four doté d'un système d'injection de combustible qui facilite le processus d'incinération. Ce type d'incinérateur nécessite le déchiquetage préalable des déchets et le retrait des matières non combustibles. Il existe une installation de ce type à Hamilton (Ontario).

ENVIRONMENT

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Ontario Environment Environnement

NEWS BACKGROUNDER

WASTE CRISIS IN THE GREATER TORONTO AREA

• The Greater Toronto Area (GTA) consists of five regional municipalities - Halton, Peel, York, Durham and Metropolitan Toronto - and 31 local municipalities.

• The GTA covers about 6,250 square kilometres, has a population of about four million people and an estimated 1.4 million households. About 2.4 million people work in the area.

• The GTA accounts for:
- 44 per cent of Ontario's population;
- 40 per cent of Ontario's households;
- less than one per cent of Ontario's land area.

• By 2021, the population of the GTA is expected to be about six million people. Urban land uses are expected to increase by more than 25 per cent in the area.

WASTE GENERATED IN THE GREATER TORONTO AREA

• Every year, industries and residents in the GTA produce about 4.3 million tonnes of garbage. Residential waste accounts for about 35 to 40 per cent of the total and industrial, commercial and institutional waste for the remaining 60 to 65 per cent.

• In 1989, the amounts produced by the individual regions were estimated to be:

-Metropolitan Toronto: 58 per cent or 2.5 million tonnes
-Peel Region: 17 per cent or 0.7 million tonnes
-York Region: 12 per cent or 0.5 million tonnes
-Durham Region: 8 per cent or 0.4 million tonnes
-Halton Region: 5 per cent or 0.2 million tonnes

WASTE DIVERTED FROM DISPOSAL IN THE GREATER TORONTO AREA

• In 1990, Peel Region diverted about 21 per cent or 171,973 tonnes of its waste from landfill sites, Metro Toronto diverted about 13 per cent or 312,127 tonnes of its waste from landfill sites, Durham Region diverted about 16 per cent or 56,925 tonnes of its waste from landfill sites and York Region diverted about 5.5 per cent or 25,000 tonnes of its waste from landfill sites. Waste diversion figures are not yet available for Halton Region.

LANDFILL SITES REACHING CAPACITY

• There are three, large and publicly-owned landfill sites and eight, small, publicly and privately-owned landfill sites open in the GTA today. The three large ones are Britannia Road in Peel Region, Keele Valley in York Region and Brock West in Durham Region.

• The Britannia Road landfill site is located on Britannia Road, west of Highway 10. Peel Region owns and operates the landfill site which opened in 1980 to serve the region. The landfill site has a capacity of about seven million tonnes. In 1991, the landfill site received about 475,000 tonnes of waste. The site is capable of taking another 225,000 tonnes of waste before it is expected to reach its capacity in May or June of this year.

• The Keele Valley landfill site is located in Vaughan, 1.5 kilometres north-east of Maple, off Keele Street. The site is owned and operated by Metropolitan Toronto and accepts waste from Metro Toronto and York Region. The landfill site, which opened in November 1983, has a capacity of about 25 million

tonnes. In 1990, the landfill site received about 2.7 million tonnes of waste. In 1991, Keele Valley received about 1.7 million tonnes of waste. The site has a remaining capacity of between 7.9 million tonnes and 13.4 million tonnes. The site is expected to reach its capacity sometime between 1996 and 1999.

• The Brock West landfill site is located on Brock Road, north of Hwy 2 in Pickering. Like the Keele Valley landfill site, the Brock West site is owned and operated by Metropolitan Toronto. The site takes waste primarily from Durham Region. The site which opened in June 1975 has a capacity of more than 12 million tonnes. Currently, it takes about 550,000 tonnes of waste a year and has room for between 1.2 and 2.6 million tonnes of waste. The Brock West site is expected to fill up sometime between 1994 and 1996.

• The landfill site in Halton Region reached its capacity in December 1988. The region has chosen another landfill site which has been approved under the Environmental Assessment Act. The site is in Milton and scheduled to open in late 1992. The municipality has been shipping its waste to a landfill operated by Niagara Waste Systems in St. Catharines and an energy-from-waste plant run by Occidental Chemical Ltd. in New York since 1988.

RESPONSE TO THE PROBLEM

• In 1989, the previous provincial government set up the Solid Waste Interim Steering Committee (SWISC) to deal with the problem of finding landfill sites for the GTA's waste. The committee had two objectives. The first was to develop a long-term waste management system that would be in place by 1996. The second was to identify short-term sites which would cover the shortfall in waste disposal capacity between 1992 and 1996. All committee decisions had to be approved by the councils of the five regions in the GTA.

• In November 1990, the Minister announced the creation of public sector authority which was later incorporated under the Business Corporations Act as the Interim Waste Authority Ltd. The authority's job is to establish three, long-term landfill sites in the GTA. One is to be located in Peel Region, one in Durham Region and one in either York Region or Metropolitan Toronto. The landfill sites are expected to open in late 1997. In addition, the Minister suspended the exemptions from the Environmental Assessment Act which had been granted to the proposed interim landfill sites in Whitevale and Brampton. She also stated that in the future all new landfills on undeveloped sites would be subject to the *Environmental Assessment Act*.

• In early April 1991, the Minister made two announcements which directly affected the search for a solution to the looming waste crisis in the GTA. The Minister said that the search for long-term waste disposal sites would be confined to the GTA. She also banned all future municipal solid waste incinerators in Ontario.

• In June 1991, the Minister announced a three-part strategy to resolve the waste crisis in the GTA. During the summer, the government began to put the strategy into action.

-To accelerate waste reduction plans in the GTA, the Waste Reduction Office began to work with the five regional municipalities and a number of stakeholder groups on a GTA-wide waste reduction plan. The inter-regional plan will include private and public sector initiatives. The group also started to discuss funding for 3Rs capital expenditures.

-The Interim Waste Authority started the search for the three, long-term landfill sites with an extensive public consultation program on the criteria to used for identifying them.

-To deal with the impending gap between expecting closing dates for the Britannia Road (late 1992) and Brock West landfill sites and the day when the three new, long-term landfill sites open in late 1997, the Minister directed Metropolitan Toronto and Peel Region to extend the lives of the Britannia Road and Keele Valley landfill sites. Durham Region was directed to build one or more transfer stations for its waste, which when the Brock West site closes will be taken to the Keele Valley landfill site. The Minister's orders fell under the emergency powers granted to the Minister of the Environment under Section 29 of the *Environmental Protection Act*.

• In October 1991, the Minister introduced Bill 143, *The Waste Management Act, 1991* for first reading. The draft act has two main thrusts: (1) Province-wide and (2) Greater Toronto Area-specific.

• The GTA-specific provisions of Bill 143 include:

-Powers to the Interim Waste Authority to establish three, long-term, landfill sites within the GTA;
-A description of the parameters for the selection of the three landfill sites including the areas of search and environmental assessment;
-Implementation of the Minister's Reports which direct Peel Region and Metropolitan Toronto to extend the life of the Britannia Road landfill site and the Keele Valley landfill site.

• The province-wide provisions of Bill 143 involve amendments to the *Environmental Protection Act*, including enabling powers to make 3Rs regulations and to approve 3Rs facilities by a more efficient process.

For further information, contact the Public Information Centre, Ministry of the Environment, 135 St. Clair Ave. W., Toronto M4V 1P5.

Or telephone:
Outside of Toronto 1-800-565-4923
In Toronto (416) 323-4321

PIBS# 1252
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-Pour remédier à la pénurie d'espace d'enfouissement prévue entre la fermeture du lieu d'enfouissement de Britannia Road (fin de 1992) et de celui de Brock West, et l'ouverture des trois nouveaux lieux d'enfouissement (vers la fin de 1997), la ministre a ordonné à la communauté urbaine de Toronto et à la région de York de prolonger la vie utile des sites d'enfouissement de Britannia Road et de Keele Valley. Elle a en outre ordonné à la région de Durham de construire une ou plusieurs stations de transfert pour ses déchets, lesquels seront expédiés au lieu d'enfouissement de Keele Valley quand celui de Brock West fermera. De tels pouvoirs extraordinaires sont conférés à la ministre en vertu de l'article 29 de la *Loi sur la protection de l'environnement.*

• En octobre 1991, la ministre a déposé en première lecture le projet de loi 143, *Loi de 1991 sur la gestion des déchets*, qui comporte des dispositions de portée provinciale et d'autres visant la région du grand Toronto.

• Les dispositions du projet de loi 143 ayant trait à la région du grand Toronto :

-confèrent à l'Office provisoire de sélection des lieux d'élimination des déchets le pouvoir de trouver trois lieux d'enfouissement à long terme dans les limites de la région du grand Toronto;

-donnent la description des paramètres de sélection des trois lieux d'enfouissement, y compris les aires de recherche et l'évaluation environnementale;

-permettent la mise à exécution des rapports de la ministre, qui obligent la région de Peel et la communauté urbaine de Toronto à prolonger la vie utile du lieu d'enfouissement de Britannia Road et de celui de Keele Valley.

• Les dispositions de portée provinciale du projet de loi 143 ont trait à la modification de la *Loi sur la protection de l'environnement.* Elles donnent entre autres le pouvoir de promulguer des règlements sur les 3 « R » et d'accélérer le processus d'approbation des installations d'application des 3 « R ».

Pour obtenir de plus amples renseignements, veuillez vous adresser au:

Ministère de l'Environnement
Centre d'information
135, avenue St. Clair ouest
Toronto Ontario
M4V 1P5
(416) 323-4321

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• Le lieu d'enfouissement de Keele Valley est situé à Vaughan, à 1,5 km au nord-est de Maple, dans la rue Keele. Il est la propriété de la communauté urbaine de Toronto, qui en fait l'exploitation, et dessert la communauté urbaine de Toronto et la région de York. Ce lieu d'enfouissement est exploité depuis novembre 1983 et a une capacité d'environ 25 millions de tonnes. En 1990, on y a enfoui environ 2,7 millions de tonnes de déchets et, en 1991, environ 1,7 millions de tonnes. Ce lieu a encore suffisamment d'espace pour 7,9 à 13,4 millions de tonnes de déchets; on prévoit qu'il sera rempli à capacité entre 1996 et 1999.

• Le lieu d'enfouissement de Brock West est situé sur le chemin Brock au nord de l'autoroute 2 à Pickering. C'est également la communauté urbaine de Toronto qui en est le propriétaire et l'exploitant. Il dessert principalement la région de Durham. Il est exploité depuis juin 1975 et a une capacité de plus de 12 millions de tonnes de déchets. À l'heure actuelle, on y enfouit environ 550 000 tonnes de déchets chaque année et il y a encore suffisamment d'espace pour 1,2 à 2,6 millions de tonnes de déchets. Le lieu d'enfouissement de Brock West sera rempli à capacité entre 1994 et 1996.

• Le lieu d'enfouissement de la région de Halton est rempli à capacité depuis décembre 1988. La municipalité a trouvé un nouveau lieu d'enfouissement à Milton et a obtenu l'autorisation, aux termes de la *Loi sur les évaluations environnementales,* de commencer à l'exploiter vers la fin de l'année courante. Depuis la fermeture de l'ancien lieu d'enfouissement en 1988, les déchets de la région de Halton sont expédiés à un lieu d'enfouissement de St. Catharines, exploité par Niagara Waste Systems, et à une usine de transformation des déchets en énergie exploitée par Occidental Chemical Ltd. dans l'état de New York.

SOLUTIONS PROPOSÉES

• En 1989, l'administration de M. Peterson formait le comité directeur intérimaire des déchets solides chargé de trouver des lieux d'enfouissement pour les déchets de la région du grand Toronto. Le comité avait deux objectifs : élaborer un système de gestion des déchets à long terme qui serait mis en oeuvre en 1996 et trouver des lieux d'enfouissement temporaires pour remédier à la pénurie d'espace d'enfouissement prévue entre 1992 et 1996. Toutes les décisions du comité devaient être approuvées par les conseils municipaux des cinq régions du grand Toronto.

• En novembre 1990, la ministre de l'Environnement annonçait la création d'un organisme public, qui devait par la suite être incorporé, aux termes de la *Loi sur les sociétés par actions,* sous le nom d'Office provisoire de sélection des lieux d'élimination des déchets. Le mandat de l'Office est de trouver trois lieux d'enfouissement à long terme dans la région du grand Toronto : un dans la région de Peel, un dans la région de Durham et l'autre dans la région de York ou dans la communauté urbaine de Toronto. L'ouverture de ces lieux d'enfouissement est prévue pour la fin de 1997.

De plus, la ministre a éliminé les exemptions des exigences de la *Loi sur les évaluations environnementales* qui avaient été accordées aux lieux d'enfouissement provisoires de Whitevale et de Brampton. Elle a aussi déclaré que les nouveaux lieux d'enfouissement seraient désormais sujets à toutes les dispositions de la Loi.

• Au début du mois d'avril 1991, la ministre a annoncé deux décisions qui ont eu un impact direct sur la recherche d'une solution à la crise des déchets de la région du grand Toronto : elle a déclaré que la recherche de nouveaux lieux d'enfouissement à long terme serait limitée à la région du grand Toronto et a interdit de construire de nouveaux incinérateurs en Ontario.

• En juin 1991, la ministre a annoncé une stratégie en trois volets pour résoudre la crise des déchets de la région du grand Toronto, stratégie que le gouvernement a commencé à mettre en oeuvre au cours de l'été.

-Afin d'accélérer les efforts de réduction des déchets entrepris dans la région du grand Toronto, le Bureau de gestion de la réduction des déchets a fait appel aux cinq municipalités régionales et à de nombreux groupes d'intérêts pour jeter les bases d'un plan de réduction des déchets d'envergure régionale, qui comprendra des projets privés et publics. Le groupe a aussi commencé à discuter du financement des dépenses en immobilisations associées aux activités d'application des 3 « R ».

-L'Office provisoire de sélection des lieux d'élimination des déchets a commencé sa recherche de trois lieux d'enfouissement à long terme par un vaste programme de consultation du public portant sur les critères de sélection de ces lieux d'enfouissement.

ENVIRONMENT INFORMATION - ENVIRONNEMENT

HIVER 1992

Ontario Environment Environnement

RENSEIGNEMENTS GÉNÉRAUX LA CRISE DES DÉCHETS DE LA RÉGION DU GRAND TORONTO

• La région du grand Toronto regroupe cinq municipalités régionales -- Halton, Peel, York, Durham et la communauté urbaine de Toronto -- ainsi que 31 municipalités locales.

• Elle englobe un territoire d'environ 6 250 kilomètres carrés, quatre millions d'habitants et 1,4 million de ménages. Environ 2,4 millions de personnes travaillent dans la région.

• La région du grand Toronto représente :

- 44 p. 100 de la population de la province;
- 40 p. 100 des ménages de la province;
- moins d'un centième de la superficie de la province.

• D'ici l'an 2021, on prévoit que la population de la région du grand Toronto passera à six millions d'habitants et que la proportion du territoire affectée à l'aménagement urbain augmentera de 25 p. 100.

LES DÉCHETS PRODUITS DANS LA RÉGION DU GRAND TORONTO

• Chaque année, environ 4,3 millions de tonnes de déchets résidentiels et industriels sont produites dans la région. Les déchets d'origine résidentielle comptent pour 35 à 40 p. 100 de cette quantité, tandis que ceux des secteurs industriel, commercial et institutionnel comptent pour 60 à 65 p. 100.

• Voici une estimation des quantités relatives de déchets produits en 1989 dans chacune des régions :

- Communauté urbaine de Toronto : 58 p. 100 ou 2,5 millions de tonnes
- Région de Peel : 17 p. 100 ou 0,7 million de tonnes
- Région de York : 12 p. 100 ou 0,5 million de tonnes
- Région de Durham : 8 p. 100 ou 0,4 million de tonnes
- Région de Halton : 5 p. 100 ou 0,2 million de tonnes

RÉACHEMINEMENT DES DÉCHETS DESTINÉS À L'ENFOUISSEMENT DANS LA RÉGION DU GRAND TORONTO

• En 1990, la région de Peel a réacheminé environ 21 p. 100, soit 171 973 tonnes, des déchets normalement destinés à l'enfouissement; la communauté urbaine de Toronto en a réacheminé environ 13 p. 100 ou 312 127 tonnes; la région de Durham, environ 16 p. 100 ou 56 925 tonnes; et la région de York, environ 5,5 p. 100 ou 25 000 tonnes. La quantité de déchets réacheminés dans la région de Halton n'est pas encore connue.

LA PÉNURIE D'ESPACE D'ENFOUISSEMENT

• La région du grand Toronto compte à l'heure actuelle trois gros lieux d'enfouissement de propriété publique et huit petits lieux d'enfouissement de propriété publique et privée. Les trois gros lieux d'enfouissement sont ceux de Britannia Road dans la région de Peel, de Keele Valley dans la région de York et de Brock West dans la région de Durham.

• Le lieu d'enfouissement de Britannia Road est situé à l'ouest de l'autoroute 10. Il est la propriété de la région de Peel, qui en fait l'exploitation depuis 1980. La capacité de ce lieu d'enfouissement est d'environ sept millions de tonnes. En 1991, on y a enfoui environ 475 000 tonnes de déchets. Ce lieu pourrait recevoir encore 225 000 tonnes de déchets; on estime qu'il sera rempli à capacité dès le mois de mai ou de juin cette année.

ENVIRONMENT
INFORMATION
ENVIRONNEMENT
SUMMER 1993
Ontario

MANDATORY CERTIFICATION OF WATER AND WASTEWATER UTILITY OPERATORS

AN OVERVIEW

By the summer of 1994 all operators of drinking water and domestic sewage treatment plants in Ontario must be licensed.

The change to a mandatory licensing from a voluntary certification program was made by regulation under section 75 of the Ontario Water Resources Act.

The mandatory licensing program will establish professional standards for Ontario's drinking water and domestic sewage treatment plant operators. It will help to ensure consistently high standards of treatment throughout Ontario and will reduce water consumption by improving the efficiency of water and sewage systems.

The licensing program, which has been voluntary since 1986, will affect the 6,500 men and women who operate municipal water and sewage treatment plants and water distribution and sewage collection systems.

About 4,000 operators were certified under the voluntary program. The remaining 2,500 operators will fall under a provision in the regulation which will allow them to receive their licences - provided they have the necessary experience.

Training will be available through a number of sources. They include the Ministry of Environment and Energy's training centre in Brampton and the Ontario Environmental Training Consortium which is made up of representatives from 21 community colleges. The Ministry of Environment and Energy will issue the licences to qualified operators.

THE LICENSING PROGRAM

What is included

All drinking water and domestic sewage treatment plants and water distribution systems and sewage collection systems will be included in the program. There are about 500 drinking water treatment plants and 418 sewage treatment plants. There are about 900 water distribution systems and 600 sewage collection systems.

Also included in the new program will be water treatment and distribution plants of the type which usually service camp grounds or summer cottage developments. These plants will have a special licence. The plants will include those which:

- pump more than 50,000 litres but less than 100,000 litres a day;
- are closed at least one month of the year;
- only disinfect the water;
- use raw water of high quality.

What is not included

There are some types of plants which will not be included in the program.

Water distribution plants:

- which have the capacity to pump fewer than 50,000 litres a day;
- which are privately owned and supply fewer than six private residences;
- which supply industries, businesses and farms with water that is not for human consumption.

Sewage works:

- which are privately owned and discharge into a sanitary sewer;
- which are privately owned and serve fewer than six private residences;
- drain agricultural land;
- do not drain or discharge either directly or indirectly into ditches, drains, wells, lakes, rivers, canals, springs, streams or storm sewers.

TYPES

The plants and systems in the program will be divided into four types. The types will be:

- sewage treatment plants,
- drinking water plants,
- water distribution systems,
- sewage collection systems.

CLASSES

Each type of plant or system will be classified according to its complexity starting with class one and going up to class four. A class one plant will be a fairly simple operation such as a sewage treatment plant with only lagoons. A class four plant will be a complex operation, such as one with a three-step sewage treatment system.

THE LICENCES

There will be four classes of licences. They will correspond to the four classes of plants and systems. Each licence will be valid only for the type of plant in which the employee works.

Under the program:

- Plant and system supervisors must be licensed for the class and type of plant in which they work.
- Operators-in-charge must be licensed for the type of plant and for the class of plant in which they work.
- Operators, who are the staff who deal with the systems' internal processes, must have a licence for the type of plant which they work in. Operators do not necessarily need a licence for the class of plant in which they work.
- Operators who do not qualify for a class one licence must get an operator-in-training licence for the type of plant in which they work.

REQUIREMENTS

Most of the requirements for licences are based on a combination of experience, education and exams. The exception is the operator-in-training licence. For this licence, the candidate only needs to pass an examination. The requirements for the four classes of licences are:

1. A class one licence requires a grade 12 education and one year of operating experience.

2. A class two licence requires a class one licence and three years of operating experience.

3. A class three licence requires a class two licence, plus two years of post-secondary education in a relevant program and four years of experience, two of which must be as an operator-in-charge at a class two or class three plant.

4. A class four licence requires a class three licence, plus four years of post-secondary education in a relevant program and four years of experience, two of which must be as an operator-in-charge of a class three or class four plant.

THE TRAINING

The training is available through a number of sources. They include the Ministry of Environment and Energy's training centre in Brampton and the Ontario Environmental Training Consortium which is composed of 21 community colleges which offer related courses. Several universities offer correspondence courses. The ministry issues the licences to operators who qualify.

The certification office, which is operated by the training consortium, evaluates courses, workshops, seminars and other related educational programs. The office assigns them what is called a contact hour, which is one hour of classroom, laboratory or seminar work. A total of 450 contact hours is equivalent to one year of post-secondary education.

Courses to be offered in the 1993/1994 school year include gas chlorination, basic waste water, basic water, electrical awareness and small water supply. Not every course is available at every college.

The 21 colleges which offer the courses are:

Algonquin College, Ottawa
Cambrian College, Sudbury
Canadore College, North Bay
Centennial College,Scarborough
Durham College, Oshawa
Fanshawe College, London
George Brown College, Toronto
Georgian College, Barrie
Humber College, Rexdale
La Cité Collégiale, Cornwall
Lambton College, Sarnia
Loyalist College, Belleville
Mohawk College, Hamilton
Niagara College, Welland
Northern College, South Porcupine
Sault College, Sault Ste Marie
Seneca College, North York
Sheridan College, Brampton
Sir Sandford Fleming College, Lindsay
St. Clair College, Windsor
St. Lawrence College, Kingston

THE EXAMINATIONS

The certification office posts examination schedules in the Training and Certification Newsletter which goes out to every certified operator and classified plant. In general, exams are held in September and March each year at examination centres in four colleges - Fanshawe, Loyalist, Algonquin and Cambrian and ministry district offices in Thunder Bay, North Bay and Timmins. Examinations are also held at the Brampton Training Centre on the third Monday of each month, except July and August.

SEASONAL OPERATORS

Those men and women who operate the water treatment or distribution plants at camp grounds are required to take and pass the operation and maintenance of seasonal water treatment course before July 1996. The course is also offered through the training consortium and at community colleges.

GRANDFATHERING PROVISIONS

All operators and operators-in-charge who were not certified in the voluntary program fall within the provisions of what in the regulation is called "the grandfathering clause". In the new program, these men and women may receive their licences according to the type of plant they work in and its classification. To receive their licences, these operators and operators-in-charge need to meet three requirements.

1. They need to meet the requirements for professional experience. For example:
   • a class one licence (a licence for a class one plant or system) requires one year of professional experience;
   • a class two licence requires three years of professional experience in a class two plant or system;
   • a class three licence requires four years of professional experience, two of which must be as an operator-in-charge in a class three plant or system;
   • a class four licence also requires four years of professional experience, two of

which must be as an operator-in-charge of a class four plant or system.

2. Before July 1996, operators need to pass an exam for the class for which they are licensed. If they do not pass it, then they will be licensed for one class lower than their original licence. For example, an operator who is licensed for a class three plant but does not pass the exam will be issued a licence for a class two plant when the original licence expires.

3. Operators (or their employers) must pay the fees for the exams and the licence.

MORE ABOUT THE LICENCES

Under the licensing program, uncertified operators must apply for their licences by Feb. 1, 1994.

All licences, which cost $75, are valid for three years. Examinations cost $50.

Licensed operators who want to upgrade their licences may do so one classification at a time. For example, a class two operator may apply for a class three licence, but not a class four licence. This does not apply to operators who fall under the grandfathering clause of the regulation. They will be granted licences for the class of the facility in which they work.

Licences are valid for five years after an operator has left the job, provided of course, the operator pays the necessary fees and renews the licence. But, an operator who allows the licence to expire must write an exam to get it back.

For information about the courses please contact the Ontario Environmental Training Consortium office at 1-800-563-6555 or the Brampton Training Centre at 1-(416) 456-0266.

For information about the examinations, where courses are offered, or for copies of *Water and Waste Water Utility Operator Certification Program Guide, Ministry of Environment and Energy Training External Calendar and Education and Certification Resource Guide*, please contact:

The Certification Office of the Ontario Environmental Training Consortium at 7510 Farmhouse Court, Brampton, Ontario L6T 5N1; 1-(416) 456-0266 or facsimile 1-(416) 456-2246.

For more information, please contact Giles Chevrier 1-(416) 456-0266.

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PIBS 2676E
1M 09/93

ENVIRONMENT
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SPRING 1993

Ontario

A draft regulation to prevent the release of fluorocarbon refrigerants: Backgrounder

On May 17, 1993, Environment and Energy Minister Bud Wildman announced a 30-day public comment period for a draft regulation that will prevent the potential release of tens of thousands of tonnes of ozone-depleting fluorocarbons from refrigerators and air conditioning equipment. The regulation is expected to become law this summer.

Some of these fluorocarbons – the most common are chlorofluorocarbons (CFCs) – are released into the atmosphere when refrigeration equipment is repaired or discarded. These chemicals deplete the ozone layer in the upper atmosphere which filters out cancer-causing ultraviolet radiation from the sun.

As part of its building-block strategy, the ministry is working step-by-step with industry towards the elimination of ozone-depleting substances. With this draft regulation and measures taken under the Ontario 1989 regulation, 90% of the sources of ozone-depleting substances will be controlled. These sources include foams, aerosols, and refrigeration equipment.

Implementation of the regulation will include a training, certification and communications program that is being developed in co-operation with industry.

In the coming months the ministry will be announcing steps to deal with halons in fire extinguishers and other ozone-depleting substances primarily used as solvents in the metal finishing industry.

The draft regulation

Refrigerants designated to be harmful to the ozone layer

Refrigerants which contain chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), or hydrofluorocarbons (HFCs) are designated as "ozone-depleting substances". They are also called "fluorocarbon refrigerants" for short.

These refrigerants are commonly used in domestic, commercial and industrial refrigerators, freezers, and air conditioning systems, referred to as "refrigeration equipment" for short.

No venting of fluorocarbon refrigerants

No one can release a fluorocarbon refrigerant into the environment. Similarly, no one can add a fluorocarbon refrigerant into refrigeration equipment, such as for testing purposes, in a way that would cause the refrigerant to be released into the environment.

Phase-out of CFC and HCFC refrigerants in motor vehicle air conditioning systems

New car, truck, and other motor vehicle air conditioning systems installed after December 31, 1995, must not contain CFCs and HCFCs. However, air conditioning systems with CFCs and HCFCs in service prior to that date may continue to be used. Only recycled CFCs and HCFCs will be available for servicing these systems.

Fines and penalties

The regulation will be passed under the authority of the *Environmental Protection Act*. Persons and companies convicted for offences under the act are subject to fines and other penalties. The basic fine structure is as follows:

- For individuals: a maximum fine of $10,000 for each day that an offence occurs on a first conviction, and a maximum fine of $25,000 for each day that an offence occurs on each subsequent conviction.
- For companies: a maximum fine of $50,000 for each day that an offence occurs on first conviction, and a maximum fine of $100,000 for each day that an offence occurs on each subsequent conviction.

In some circumstances, even more onerous fines apply and there can be a possibility of imprisonment.

Who's affected?

There are four groups of people affected by the regulation:

- Those who own refrigeration equipment such as homeowners, car and truck owners, building owners, and business owners;
- Those who repair and refill refrigeration equipment such as service technicians in the automotive and appliance industries;
- Those who sell fluorocarbon refrigerants such as refrigerant producers and wholesalers selling refrigerants to automotive and appliance manufacturing and service companies;
- Those who collect used refrigeration equipment for disposal and recycling such as municipal waste management and public works departments, salvage companies, and retailers who collect old refrigerators and air conditioners.

Requirements for people who own refrigeration equipment containing fluorocarbon refrigerants

As of January 1, 1994:

- They must have leaking air conditioners (vehicle and home) and refrigerators repaired and refilled by certified persons. These certified persons must have an "Ozone Depletion Prevention Card" which shows that they have completed a course and an examination approved by the Ministry of the Environment and Energy on the use and handling of ozone-depleting substances in refrigeration.
- They can have air conditioners (vehicle and home) and refrigerators dismantled and disposed of only after they have been tagged/labelled free of ozone-depleting substances by a certified person.
- They must have leaking refrigeration equipment fixed and tagged by a certified person before it can be refilled with a fluorocarbon refrigerant.
- They will not be able to buy fluorocarbon refrigerants unless they are a wholesale refrigerant supplier or they are a certified person.

Requirements for people who repair and refill refrigeration equipment containing fluorocarbon refrigerants

As of January 1, 1994:

- To fix refrigeration equipment, they must have in their possession an "Ozone Depletion Prevention Card" which shows that they have completed a course and an examination approved by the Ministry of Environment and Energy on the use and handling of ozone-depleting substances in refrigeration.
- After they test refrigeration equipment for leaks, they must put a notice or tag on the equipment. They must inform the owner of the equipment about the results of the test and keep records of the test for at least three years.

- They can refill refrigeration equipment only if it has been tagged "leak free." If the tag is more than six months old or if it looks like the equipment has been damaged, the equipment cannot be refilled with fluorocarbon refrigerants.
- If they drain refrigeration equipment or determine that it is empty, they must place a notice/tag on all refrigeration equipment indicating that it no longer contains the fluorocarbon refrigerant.
- They cannot dismantle or dispose of refrigeration equipment unless it is certified empty.
- They cannot throw out a storage container used for fluorocarbon refrigerants, and they must make a reasonable effort to refill or recycle the container.

Requirements for people who sell fluorocarbon refrigerants

As of September 1, 1993:

- They must charge a minimum $25 deposit on all storage containers filled with a fluorocarbon refrigerant. They must take back every used container originally sold by them and refund the deposit.

As of January 1, 1994:

- They can only sell fluorocarbon refrigerants in a refillable or recyclable storage container to a wholesaler or a certified person. Retail sales to uncertified persons will not be permitted.
- They must keep a record of every sale of a storage container of fluorocarbon refrigerant for at least three years after the date of sale.

These requirements do not apply to manufacturers of fluorocarbon refrigerants who deposit the refrigerant directly into a tank vehicle or refrigeration equipment.

As of January 1, 1995:

- They can sell fluorocarbon refrigerants only in storage containers which are both refillable *and* recyclable.

Requirements for people who collect and handle used refrigeration equipment containing fluorocarbon refrigerants for disposal and recycling

As of January 1, 1994:

- They can only accept used refrigeration equipment (also known as "white goods") for dismantling, disposal and recycling if it displays a tag or notice signed by a certified person that it is empty of fluorocarbon refrigerants.
- They can dismantle, destroy or recycle a storage container that held fluorocarbon refrigerants only if it displays a tag or notice signed by a certified person that it is empty.
- They cannot accept for landfilling a storage container with a label indicating that it contains or did contain a fluorocarbon refrigerant.

PROVINCIAL ACTION TO REDUCE OZONE-DEPLETING SUBSTANCES

Under Ontario's reduction program for ozone-depleting substances, the following actions have been taken by the provincial government:

- Ban on CFCs in aerosols in 1989.
- Complete phase-out of CFC-blown foams by December 31, 1993.
- Mandatory collection of mobile refrigerants (car, truck, train air conditioners and refrigeration units) since July 1, 1991.
- Working with industry, established a system for the collection and recycling of spent refrigerants. The province amended the regulations in September 1990 to set up an administrative infrastructure for stationary and mobile refrigerant recycling.

The draft regulation banning the release of fluorocarbon refrigerants will come into effect in summer 1993; the training, certification, and handling requirements will start January 1, 1994. Further regulatory measures are planned to prevent the release of halons used in fire extinguishers and other ozone-depleting substances primarily used as solvents in the metal finishing industry.

Ontario was the first province in Canada to make laws which support the intent of the 1987 *Montreal Protocol for Substances that Deplete the Ozone Layer,* signed by more than 60 countries. The Ministry of Environment and Energy's goal is to reduce Ontario's use of CFCs from the 1986 level by more than half in 1993. In March 1992, the Canadian Council of Ministers of the Environment (CCME), representing all provincial, territorial and federal environment ministries, agreed to the elimination of the production of CFC molecules in Canada and their import into and export from Canada, by January 1, 1996.

CFCs and the Ozone Layer

Chlorofluorocarbons (CFCs) are a family of long-lasting synthetic chemicals that cause damage to the ozone layer located 15-40 km above the earth's surface. The ozone layer screens out certain types of ultraviolet radiation from the sun. This radiation can cause skin cancer in humans and animals, disrupt crop growth and kill the phytoplankton food supply for fish in oceans. Over the past 20 years, the ozone layer has shrunk by an estimated one to three per cent, mainly because of the effect of the CFCs and other synthetic ozone-depleting substances containing chlorine and bromine compounds. The effect is made worse when the CFCs mix with volcanic ash.

CFCs were developed about 60 years ago as a substitute for ammonia in refrigerators. CFCs are used as coolants in refrigerators and air conditioners, as well as blowing agents in foam product manufacturing, as cleaning solvents for electrical components, and for use in aerosol sprays and hospital sterilization procedures (many of these applications have now been phased out in Ontario). Related to CFCs, halons are a group of chemicals that contain bromine. They are used almost exclusively in fire-protection applications.

Facts and Figures

- Ontario accounts for about half of the annual amount of the CFCs used in Canada. In 1986, the base year for determining future consumption levels, approximately 20,000 tonnes of CFCs were consumed in Canada.
- How CFCs were used in Canada for 1986 and 1989:

	1986	1989
Refrigeration & air conditioning	33 %	44 %
Foam	42 %	39 %
Solvent	9 %	12 %
Aerosol	12 %	0 %
Miscellaneous	4 %	5 %
Total	100 %	100 %

- The total stock of CFCs in use in Ontario as a refrigerant is estimated at 40,000 tonnes.
- In 1990, an estimated 11,100 tonnes of CFCs were released into the atmosphere from all sources in Ontario.
- CFCs have long atmospheric lifetimes of 70 to 100 years. Only about 6.4 % of the total CFCs emitted are destroyed by sunlight by the time they reach the outer parts of the earth's atmosphere.
- In 1992, about 270,000 home refrigerators were sold in Ontario. The total number of home refrigerators and freezers is about 5 million. As well, in 1992 there was a total of 600,000 window air conditioners and 1.1 million central air conditioning units in residential use in Ontario.

- An estimated 48,000 to 60,000 home refrigerators are thrown out every year in Ontario (including 12,000 to 15,000 in Metropolitan Toronto). An estimated 124 grams of CFCs per discarded refrigerator could escape into the atmosphere.
- An estimated 3.6 million cars and 500,000 trucks in Ontario have air conditioning systems. Approximately 90% of all cars sold in Ontario in 1992 have air conditioning units, most of which still use CFCs as the main coolant chemical.
- A recent Environment Canada survey of service stations in the Ottawa area found that 60 % of cars have negligible amounts of refrigerant in them when they are brought in for servicing; ie. the refrigerant has already leaked into the atmosphere. Approximately 1.3 kg of CFC-12 are required to fill the A/C system of a new automobile. The average car requires 0.4 kg per year for servicing.
- The Canadian Dermatology Association estimates that over the past 25 years there has been a 400 % increase in the number of skin cancer cases for men and a 250 % increase for women.

Public comments

Send written comments on the draft regulation to:

"REFRIGERANTS REGULATION"
Waste Management Branch
Ministry of Environment and Energy
135 St. Clair Ave. W.
Toronto, Ontario M4V 1P5

For more information

To order more copies of this publication or other publications on waste issues, call or write:

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135 St. Clair Ave. W.
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PIBS 2542e
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ENVIRONMENT
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ENVIRONNEMENT
SPRING 1993
Ontario

Ontario achieves 25 per cent waste reduction goal

The province of Ontario recently has achieved a major environmental milestone. Through the efforts of hundreds of municipalities, thousands of businesses, schools, hospitals, community and environmental organizations, and millions of Ontario households in 1992, we cut our waste by 25 % compared to the waste produced in 1987.

This percentage of waste reduction is *per capita*, and excludes waste that was transported for disposal outside of Ontario's borders.

How we did it

By practising the 3Rs - reduction, reuse and recycling - Ontarians have shown that it is possible to make significant cuts in waste production, and thereby helping to protect the environment.

Using the Blue Box, more than three million Ontario households now help to redirect more than 420,000 tonnes of valuable resources from landfill. The used paper, plastics, newsprint, glass, steel, aluminum and other materials are being re-processed into hundreds of new products, as well as being recycled back into fine paper, newspapers and containers.

About 800,000 Ontario homes use their backyard composters to divert up to one third of their waste from disposal. Finished compost enriches the earth in lawns and gardens. Many people also separate leaf and yard materials for collection and composting by their municipality.

Seven out of 10 Ontario companies have office waste reduction programs. Hospitals, government buildings, more than 3,000 schools, and hundreds of industries participate actively in reducing waste.

Here are some examples of the outstanding efforts by Ontarians to reduce waste:

- *J. M. Schneider Ltd.*, the Kitchener-based meat processing firm, has a number of initiatives encouraging the reduction of consumer waste through changes in packaging. Since 1987, continuous improvement programs that focus on waste minimization have diverted 50 % of their processing and office wastes from disposal.
- *Toyota Motor Manufacturing Canada*, in Canada, brought the philosophy "think globally, act locally" to the assembly line. They have reduced the amount of waste per car from 140 pounds to 7.5 pounds. Co-operation from 1,100 employees has diverted 95 % of production and office wastes since December 1989.
- *Bell Canada's* Zero Waste Program has received much acclaim to date and is now being introduced in Bell Canada buildings across the province. Since July, 1991, the company's offices in Thunder Bay have achieved a waste diversion rate of 80%. Currently Bell Canada is working with other businesses in the community in an effort to share their success.
- *The Mutual Insurance Group's* Green Team, in Waterloo, has generated enthusiasm and commitment in its 2,100 employees and achieved a diversion rate of 80% since January, 1990.

- *Trent University*, Peterborough, has changed life on campus in an attempt to address students' environmental concerns. Its grassroots approach has resulted in a diversion rate of 89 %, of which half is achieved by shipping food wastes to a local pig farmer.
- *Ross Memorial Hospital*, Lindsay, diverted 68 % of the hospital's landfilled wastes between 1988 and 1991. The hospital also diverted 24 % of its incinerated biomedical wastes. It expects to achieve a 45 % reduction in the combined amounts that are landfilled and incinerated by the end of 1993.
- Dave Johnson, owner and manager of *Sundridge IGA*, now makes 90 per cent fewer trips to the landfill. Much of the diverted waste is food and old corrugated cardboard. The food waste is used by local farms to feed pigs. The cardboard is sold in Toronto. Revenue from the cardboard sales is presently covering the shipping costs. Sundridge IGA is located about 60 km south of North Bay.
- *Quinte Regional Recycling*, in the County of Centre and South Hastings, launched the first Blue Box 2000 program. The project has demonstrated the potential diversion as a result of expanding the traditional Blue Box program to include 15 different types of materials. The county is achieving a diversion rate of 35 % through this alone.
- *Akwesasne Reserve*, a native community of 8,000 near Cornwall, started its waste diversion program in mid-1989 and diverted 11 % in the first six months of 1992.

Ontario's waste reduction goals

Until recently, Ontarians had the dubious honour of being among the world's biggest garbage producers. And with this honour came a heavy environmental price tag. Something had to be done to reduce the mountains of garbage going to disposal.

In October 1990, the Minister of the Environment announced two goals for Ontario:

To reduce the amount of waste going to disposal in Ontario by at least 25 per cent in 1992 and by at least 50 per cent by the year 2000.

The goals are based on a reduction from 1.0 tonne per person of non-hazardous solid waste sent to disposal in 1987 by all Ontario households, industries, businesses and institutions.

These are *provincial* goals. However, many municipalities and some private and public corporations have adopted similar waste reduction targets.

In order to meet the provincial goals, in February 1991, Ontario's Waste Reduction Action Plan was announced. Its focus is the 3Rs: reduction at source, reuse and recycling. Practised in this order, the 3Rs result in a real *reduction* of materials going to disposal. Or seen in another way, practising the 3Rs also leads to the *diversion* of waste materials from disposal to productive uses.

Implementation of Ontario's Waste Reduction Action Plan, in combination with other key factors, has led to the successful achievement of the first waste reduction goal: 25% reduction of waste in 1992.

The next 25 per cent

Having come this far, however, it is still easy to lose sight of how much more has to be done to achieve Ontario's second waste reduction goal: reducing waste by at least 50 % from the 1987 level by the year 2000. The second goal may be an even greater challenge than the first one; and achieving it will rely on even more co-operative action than before.

The Ontario Government has passed a new law giving it the powers to implement Ontario's Waste Reduction Action Plan. For example, recycling will be mandatory in all but the smallest municipalities and most major industries will need to have waste reduction programs in place. At the same time, new rules will make it easier for communities to establish recycling and composting facilities. New laws, just introduced, will give municipalities the unquestioned authority to plan, develop and operate recycling facilities and to embark on aggressive waste reduction programs. An improved municipal waste planning process will allow greater opportunity for public input into decisions on waste management that affect individual communities.

Working in partnership with business, community groups and municipalities, the Ontario Government is funding and testing new ideas for making products which use less material and energy. It is also helping the development of products which can be recycled or made of recycled material. Manufacturers also are being encouraged to become responsible for their products and the waste they generate. There will be an added emphasis on governments and business working together to develop strategies for expanding markets for used materials. Similar partnerships in the areas of waste reduction education and training have been made with professional organizations, non-governmental organizations and community colleges.

Addendum: Measuring success

It's not easy keeping track of all the garbage that is generated and disposed of in Ontario. So how do we know that the 25 % waste reduction goal actually was achieved in 1992?

First, we need a starting point to measure how far we've come. For Ontario's waste reduction goals that starting point is 1987.

Second, the way we measure progress towards the waste reduction goals needs to take into account population changes. That is why it is more appropriate to express the goals in terms of *per capita* waste reduction.

Third, we need a standard unit for quantifying waste materials. Feasibility and convention are the guiding principles here. In Ontario, garbage quantity is generally measured by weight, usually in metric tonnes, rather than volume.

The ideal is to account for the garbage produced by every home, school or factory in the province. But this is not practical. We can only approximate the amount of solid waste *generated at source* by the amount sent *for disposal* in municipal and private landfills. It is really the changes in overall waste disposal tonnages that determine whether or not the waste reduction goals have been met.

To address these issues, the Ministry of Environment and Energy has been working with individual municipalities, the Association of Municipalities of Ontario, and the Ontario Waste Management Association to standardize waste data collection methods. In June 1992, the Minister published *Initiatives Paper No. 4: Measuring Progress Towards Ontario's Waste Reduction Targets*, which includes a detailed classification method for wastes and recyclable materials. A computerized Waste Diversion Information System (WDIS) was set up to document waste disposal and diversion data.

KEY INDICATOR	1987	1992
ONTARIO POPULATION*	8,883,000	9,624,000
WASTE DISPOSAL (Tonnes)**	8,883,000	7,181,000
ANNUAL DISPOSAL RATE PER CAPITA	1.0 tonnes/capita/yr	0.75*** tonnes/capita/yr
WASTE REDUCTION ACHIEVED	—	25%

* Source: Ministry of Municipal Affairs *Annual Municipal Directory 1992.*

** Residential and IC&I non-hazardous solid waste sent to disposal in Ontario plus waste that was shipped for disposal outside Ontario.

*** Rounded down to two decimal points. The actual figure is 0.7461.

The 116 municipalities operating waste disposal facilities and the 17 private landfills in Ontario were asked to provide disposal tonnages for 1987 and 1992. Information for 1992 was collected in September 1992 for the first half of the year and again in January 1993 for the second half of the year. Information was provided to the WDIS by municipalities and the private sector on a voluntary basis. The responses from 111 municipalities and 15 private landfills covered approximately 90 per cent of the province's population.

The data gathered from the reporting municipalities and private landfills was verified through follow-up interviews and by cross-referencing with data from other available sources, such as waste management master plan studies. Unusual variations between similar-sized or adjacent municipalities, information gaps and discrepancies were identified and resolved.

Waste data for the non-reporting parts of the province were then extrapolated from the reporting parts of the province, based on comparisons of population, density and location.

Waste that was transported for disposal outside the province was *not* included as part of the waste reduction estimate. Rather, it was counted *as if it had been disposed of in Ontario.* The export data was collected and analyzed for the ministry by an independent engineering firm.

Based on the data received and analyzed, a 25% decrease in waste disposal tonnage per capita was calculated. The 25% waste diversion estimate is derived from the best available information and is considered to be a conservative estimate of Ontario's achievement.

More information

For more information on waste issues contact:

The Ministry of Environment and Energy
Public Information Centre
135 St. Clair Ave. W.
Toronto, Ontario M4V 1P5

Telephone: (416) 323-4321
1-800-565-4923

For information about waste reduction programs and services in your community, contact the department in your municipality responsible for waste reduction and waste management services.

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INDICATEUR	1987	1992
Population de l'Ontario*	8 883 000	9 624 000
Déchets éliminés (en tonnes)**	8 883 000	7 181 000
Taux d'élimination annuel (en tonnes par habitant)	1,0	0,75***
Taux de réduction atteint	—	25 %

* Source : Répertoire des municipalités — 1992, ministère des Affaires municipales

** Déchets solides non dangereux provenant des secteurs I, C et I, qui ont été éliminés en Ontario, plus ceux qui ont été transportés hors de la province.

*** Mesure arrondie à la deuxième décimale (0,7461).

On a demandé aux 116 municipalités ontariennes exploitant des installations d'élimination des déchets et aux gestionnaires des 17 lieux d'enfouissement privés de la province de fournir des données sur la quantité de déchets éliminés en 1987 et en 1992. Les données pour le premier semestre de 1992 ont été recueillies en septembre dernier; celles du second trimestre ont été recueillies en janvier 1993. Ces données, qui seront versées au système d'information (SIRD) ont été fournies volontairement par les municipalités et le secteur privé. Le Ministère a reçu des données provenant de 111 municipalités et de 15 lieux d'enfouissement privés, ce qui représente environ 90 p. 100 de la population ontarienne.

Les données fournies ont été confirmées par la suite, lors d'entrevues, de suivis et de contre-vérifications à partir d'autres données, par exemple, des études sur les plans directeurs de gestion des déchets. Les écarts trop prononcés dans les données provenant de municipalités adjacentes ou d'importance comparable, les lacunes et les divergences ont été identifiés et corrigés.

Pour les régions qui n'ont pas fourni de données, on a dû extrapoler à partir des données obtenues dans d'autres régions. Des comparaisons d'ordre démographique et géographique ont donc été effectuées pour obtenir les approximations les plus réalistes. Les données sur les déchets produits en Ontario qui ont été éliminés à l'extérieur de la province *n'ont pas été* utilisées pour gonfler la mesure des progrès réalisés. Elles ont été incorporées aux totaux *comme si ces déchets avaient été éliminés en Ontario*. La compilation et l'analyse des données portant sur les déchets exportés ont été confiés à une firme d'ingénieurs indépendante.

L'analyse des meilleures données disponibles a révélé que l'Ontario a réussi à réduire sa production de déchets de 25 p. 100 entre 1987 et 1992. Cette mesure, qui est exprimée en tonnes par habitant, par année, représente une approximation conservatrice.

Renseignements additionnels

Pour obtenir de plus amples renseignements sur la gestion des déchets, prière de communiquer avec le :

Ministère de l'Environnement et de l'Énergie
Centre d'information
135, avenue St. Clair ouest
Toronto (Ontario) M4V 1P5
Téléphone : (416) 323-4321 ou 1-800-565-4923

Pour en savoir plus long sur les programmes et les services communautaires de réduction des déchets, veuillez communiquer avec votre municipalité.

PIBS 2538b
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Le gouvernement de l'Ontario a promulgué une loi l'autorisant à mettre en application le Plan d'action en matière de réduction des déchets. Grâce à cette mesure réglementaire, les plus grandes municipalités et la plupart des grosses entreprises doivent maintenant mettre sur pied des programmes de recyclage. De plus, certaines dispositions ont été modifiées de manière à faciliter l'autorisation d'installations centrales de recyclage et de compostage. De nouvelles lois ont aussi été adoptées pour donner aux municipalités la liberté absolue de planifier, d'aménager et d'exploiter des installations de recyclage, ainsi que de lancer des programmes énergiques de réduction des déchets. La réforme du processus de planification de la gestion des ordures ménagères donnera en outre au public l'occasion de participer à la prise de décisions sur les activités de gestion des déchets au sein de leur collectivité.

Le gouvernement de l'Ontario s'allie avec le milieu des affaires, les groupes communautaires et les municipalités pour financer et mettre à l'essai des techniques de production novatrices qui utilisent moins de matières premières et moins d'énergie. Il encourage d'ailleurs la mise au point de produits recyclables ou fabriqués à partir de produits recyclés et demande aux fabricants de prendre une plus grande responsabilité à l'égard de leurs produits. L'industrie et le gouvernement devront aussi unir leurs efforts pour créer des marchés pour les matières recyclées. Le gouvernement a déjà conclu, avec des associations professionnelles, des organismes non gouvernementaux et des collèges communautaires, des ententes fructueuses visant la sensibilisation et la formation du public en matière de réduction des déchets.

Addendum : La mesure du succès

Comment s'y est-on pris pour mesurer nos progrès en matière de production et d'élimination des déchets?

D'abord il a fallu un point de référence pour mesurer nos progrès. Pour ce qui est des objectifs de réduction des déchets de l'Ontario, nous avons choisi 1987 comme année de référence.

Ensuite, il nous a fallu tenir compte des fluctuations démographiques. C'est pour cela que le taux de réduction des déchets est exprimé en tonnes par habitant.

Et enfin, il nous a fallu un étalon de mesure pour quantifier la production de déchets. Faisabilité et convention ont été les deux critères qui ont déterminé le choix des unités de mesure. Ainsi, en Ontario nous exprimons la quantité de déchets en unités de poids, généralement en tonnes métriques, plutôt qu'en unités de volume.

Idéalement, on aurait pu tenir compte des déchets produits par chaque foyer, chaque école ou chaque usine en Ontario, mais en termes pratiques, une telle mesure n'est pas réaliste. Nous ne pouvons que déduire la quantité de déchets *produits à la source* à partir de la quantité totale de déchets *éliminés* dans les lieux d'enfouissement municipaux et privés. C'est donc la différence entre le poids des déchets éliminés chaque année qui nous permet de mesurer nos progrès en matière de réduction des déchets.

Le ministère de l'Environnement et de l'Énergie a entrepris de normaliser les méthodes de compilation des données avec la collaboration de différentes municipalités, de l'Association des municipalités de l'Ontario et de l'Ontario Waste Management Association. En juin 1992, le Ministère a rendu public le *Document de travail nº 4 : Mesure des progrès de l'Ontario en matière de réduction des déchets*, qui décrit une méthode de classification des déchets et des matières recyclables. Le Ministère a aussi mis sur pied un système d'information sur le réacheminement des déchets (SIRD) qui permettra d'évaluer les quantités de déchets éliminés et réacheminés.

- L'administration de l'université Trent, à Peterborough, a transformé la vie des étudiants de l'université pour répondre à leurs préoccupations environnementales. Les initiatives adoptées ont permis de réacheminer 89 p. 100 des déchets, dont la moitié se compose de restes d'aliments, qui sont envoyés à un éleveur de porcs des environs.
- L'hôpital Ross Memorial de Lindsay a réacheminé, entre 1988 et 1991, 68 p. 100 des déchets normalement destinés à l'enfouissement. L'hôpital a aussi réacheminé 24 p. 100 des déchets biomédicaux qui sont habituellement incinérés. L'administration prévoit réduire de 45 p. 100 la quantité de déchets normalement enfouis ou incinérés d'ici la fin de 1993.
- M. Dave Johnson, propriétaire et gérant du supermarché IGA de Sundridge, a réduit de 90 p. 100 le nombre de ses déplacements au lieu d'enfouissement. La majeure partie des déchets récupérés est constituée d'aliments et de carton pour boîtes. Les déchets alimentaires sont expédiés à des entreprises d'élevage de porcs de la région. Le carton est vendu à Toronto. Les recettes de la vente du carton servent à défrayer les coûts d'expédition. Le supermarché IGA de Sundridge se situe à environ 60 km au sud de North Bay.
- L'association Quinte Regional Recycling, du comté de Hastings-Centre et Sud, a lancé le premier programme de la boîte bleue 2000. Le but du programme : montrer ce qu'il est possible d'accomplir en élargissant le programme traditionnel de la boîte bleue de manière à inclure 15 nouveaux types de matériaux recyclables. Le comté a réussi à réacheminer 35 p. 100 de ses déchets grâce à ce seul programme.
- La réserve d'Akwesasne, une collectivité autochtone de 8 000 âmes, près de Cornwall, a lancé un programme de réacheminement des déchets en 1989 et a réussi à réacheminer 11 p. 100 de ses déchets dans la première moitié de l'année 1992.

Les objectifs de réduction de l'Ontario

Jusqu'à tout récemment, l'Ontario avait la réputation peu enviable de figurer parmi les plus gros producteurs de déchets au monde, et il en souffrait les conséquences environnementales. Il était donc plus que temps de remédier à la situation.

Ainsi, en octobre 1990, le ministère de l'Environnement annonçait deux grands objectifs provinciaux en matière de réduction des déchets.

Réduire d'au moins 25 p. 100 en 1992 et d'au moins 50 p. 100 d'ici à l'an 2000 la quantité de déchets normalement destinés à l'enfouissement.

Ces objectifs sont calculés à partir des chiffres de 1987, soit 1 tonne par personne de déchets solides non dangereux provenant des sources industrielle, résidentielle, commerciale et institutionnelle, qui ont été acheminés cette année-là vers les lieux d'enfouissement.

Ces objectifs ont été fixés pour la province dans son ensemble, mais maintes municipalités et entreprises publiques et privées ont adopté des objectifs semblables.

En vue d'atteindre les objectifs qu'il s'était fixés, le gouvernement annonçait, en février 1991, le Plan d'action ontarien en matière de réduction des déchets. Son but : promouvoir l'application des 3 «R », soit la réduction à la source, la réutilisation et le recyclage. En respectant cet ordre de priorité, l'application des 3 « R » se traduit par une *réduction* réelle des déchets destinés à l'enfouissement, ou, vu sous un autre angle, elle permet de *réacheminer* les déchets à des fins utiles.

La mise en oeuvre du plan d'action et d'autres facteurs ont permis à la province d'atteindre son premier objectif, soit de réduire de 25 p. 100, en 1992, la quantité des déchets normalement destinés à l'enfouissement.

Les prochains 25 p. 100

Maintenant que le premier palier a été atteint, il est important de ne pas perdre de vue notre objectif global et de canaliser nos énergies en vue d'atteindre le second palier, soit de réduire de moitié, d'ici l'an 2000, la quantité de déchets produits en Ontario, par rapport à 1987. Cette deuxième phase risque de demander plus d'efforts que la première; une collaboration étroite entre tous les secteurs de la société sera essentielle.

ENVIRONMENT INFORMATION-ENVIRONNEMENT

PRINTEMPS 1993

Ontario

L'Ontario a atteint son objectif de réduction des déchets

L'Ontario a atteint l'objectif qu'il s'était fixé pour 1992, soit une réduction des déchets de 25 p. 100 par rapport à 1987, et ce, grâce aux efforts concertés de centaines de municipalités, de milliers d'entreprises, d'écoles, d'hôpitaux, de regroupements communautaires et de groupes de défense de l'environnement, ainsi que de millions de foyers.

Il s'agit du pourcentage de réduction des déchets par habitant et celui-ci ne tient pas compte des déchets qui ont été éliminés hors de la province.

Que nous vaut ce succès?

La population de l'Ontario, en mettant en pratique les 3 « R », soit la réduction, la réutilisation et le recyclage, a clairement démontré qu'il était possible de réduire considérablement la production de déchets et de poser des gestes concrets pour protéger l'environnement.

Les quelque 3 millions de ménages qui utilisent la boîte bleue contribuent à réacheminer environ 420 000 tonnes de ressources valorisables normalement destinées à l'enfouissement. Le papier, le plastique, les journaux, le verre, l'acier, l'aluminium et d'autres matières entrent dans la fabrication de centaines de nouveaux produits ou sont transformés en papier fin, en papier journal et en contenants.

Environ 800 000 ménages ontariens pratiquent le compostage, ce qui leur permet de réduire parfois du tiers leur production de déchets. De plus, le compost qu'ils produisent sert d'engrais pour leur pelouse et leur jardin. Beaucoup de gens récupèrent aussi les feuilles et les déchets de jardin, qui sont ensuite acheminés vers un centre de compostage municipal.

Soixante-dix pour cent des entreprises ontariennes ont mis sur pied des programmes de réduction des déchets. Les hôpitaux, les édifices gouvernementaux, plus de 3 000 écoles et des centaines d'industries participent activement à la réduction des déchets.

Voici quelques exemples d'initiatives de réduction qui ont remporté un grand succès :

- *J. M. Schneider Ltd.*, une entreprise de transformation de la viande, a lancé plusieurs initiatives visant à réduire sa production de déchets. Elle a notamment modifié certains modes d'emballage. Depuis 1987, l'entreprise a mis sur pied des programmes d'amélioration constante qui mettent l'accent sur la réduction des déchets et a ainsi réacheminé à des fins utiles 50 p. 100 de ses déchets de procédé et de bureau.
- La société *Toyota Motor Manufacturing Canada* met en pratique le slogan « À enjeu mondial, action locale » même sur sa chaîne d'assemblage. Elle a réussi à ramener sa production de déchets de 140 livres par auto à 7,5 livres. Depuis décembre 1986, grâce aux efforts concertés de ses 1 100 employés, la société réachemine 95 p. 100 de ses déchets de production et de bureau.
- L'équipe écologique de la *Mutual Insurance Group*, à Waterloo, a inculqué les principes des 3 « R » aux 2 100 employés de l'entreprise. Celle-ci réachemine, depuis janvier 1990, 80 p. 100 de ses déchets.

ENVIRONMENT INFORMATION ENVIRONNEMENT

SPRING 1993

Ontario's new 3Rs regulations: Backgrounder

Introduction

On April 29, 1993, Minister of Environment and Energy Bud Wildman announced the Ontario Government's intent to implement a set of five new waste reduction regulations into law in August 1993. Known as the 3Rs regulations, they will define the mandatory rules and requirements for reduction, reuse and recycling activities in the province.

Summary

- All regulations apply only to non-hazardous solid waste from residential and industrial, commercial and institutional (IC&I) sources.
- Residential recycling and backyard composting programs will be required to be provided by all municipalities with a population of 5,000 or more.
- Leaf and yard waste composting will be required to be provided by municipalities of 5,000 or more which currently have a leaf and yard waste collection program. Leaf and yard waste collection and composting will be required in municipalities of 50,000 or more in population whether or not they currently have a leaf and yard waste collection program.
- Annually updated waste audits, waste reduction workplans and recycling programs will be required for major waste generators in designated industrial, commercial and institutional sectors.
- Packaging audits, updated every two years, and packaging reduction workplans will be required for major packaging users and importers in designated food, beverage, paper or chemical manufacturing sectors.
- Recycling facilities may be eligible for exemptions from Certificate of Approval requirements under the Environmental Protection Act, provided that certain standards are met.

Implementation

The ministry consulted widely on the 3Rs regulatory measures and is now implementing specific regulations resulting from these consultations. The implementation phase will be in three steps:

Notice of Intent

The first step begins with the publication of a notice of intent and ends after a 90-day period (July 31, 1993). The ministry wants to ensure that those directly affected by the 3Rs regulations are able to prepare for any actions they will be required to take. Specific details of the regulations are being made available during this first stage.

Promulgation

The second step is the filing of the 3Rs regulations with the Registrar of Regulations. The regulations become law on the date they are filed and those affected must begin to take steps to comply. Soon after they are filed, the regulations will be published in the Ontario Gazette.

Compliance
Setting compliance deadlines is the third step of the implementation process. The date that the regulations come into force will be used as the base date for the compliance deadlines, which will be included in the regulations. Most of the provisions will begin to apply about six to 12 months from the date the regulations are promulgated.

Background

The new 3Rs regulations are part of Ontario's Waste Reduction Action Plan, announced in February 1991. The action plan is the basic road map for reaching Ontario's waste reduction targets: at least a 25 per cent reduction in waste going to disposal by the end of 1992, and at least a 50 per cent reduction by the year 2000. The waste reduction targets are based on a reduction from 1.0 tonnes per person of solid waste sent to disposal in 1987 by all Ontario households, industries, businesses and institutions.

The 1992 target has been achieved through the efforts of hundreds of municipalities, thousands of businesses, industries, schools, hospitals and government offices, and more than three million Ontario households. Having come this far, however, it is still easy to lose sight of how much more has to be done to achieve the 50 per cent target by the year 2000. That's why some rules and guidelines are necessary to keep the province on course.

Details of the regulations were first described in *Initiatives Paper No. 1: Regulatory Measures to Achieve Ontario's Waste Reduction Targets*, released for 60-day public consultation in October 1991. The consultation period was extended for another 30 days in December 1991. A total of 344 submissions were received from municipalities, affected IC&I, environmental, labor and community groups, and private citizens. Additional consultation took place during public hearings on the *Waste Management Act* (Bill 143) in January-April 1992. Informal consultation with affected groups continued into winter and spring 1993.

IMPLEMENTATION SCHEDULE

Required actions	*Affected parties*	*Effective date*
Residential recycling programs	Municipalities in Southern Ontario Municipalities in Northern Ontario *	July 1, 1994 July 1, 1996 *Note: Date changes to July 1, 1995 if depot system is chosen for residential recycling program (see page 3).*
Backyard composting, leaf and yard waste composting	Municipalities in Southern Ontario Municipalities in Northern Ontario *	July 1, 1994 July 1, 1995
Waste audits and waste reduction workplans	Designated major IC&I waste generators	six months from date of promulgation **
IC&I recycling programs	Designated major IC&I waste generators	12 months from date of promulgation
Packaging audits and packaging reduction workplans	Designated major packaging users	six months from date of promulgation
Rules for establishing recycling sites	Owners/operators of recycling sites	At date of promulgation

* Territorial districts of Algoma, Cochrane, Kenora, Manitoulin, Nipissing, Parry Sound, Rainy River, Sudbury, Thunder Bay, Timiskaming and the Regional Municipality of Sudbury

** Special conditions apply to designated construction and demolition projects (See note on page 5.)

Municipal 3Rs programs

Source separation (recycling) programs

All local municipalities of 5,000 or more in population will be required to establish and maintain source separation programs (Blue Box waste management systems). The programs must include the following:

- All properties serviced by a municipal garbage collection operation must have access to a reasonably equivalent recycling collection service.
  - If garbage is collected at a depot, then recyclable materials must also be collected at the depot.
  - If garbage is collected at the curbside, then recyclable materials must also be collected at the curbside.
  - If garbage is accepted at a waste disposal site, then recyclable materials must also be accepted at the site.
  - Municipalities between 5,000 and 15,000 population in Northern Ontario may choose a depot system regardless of the type of garbage collection operation. *However, if this option is chosen, it must be implemented by July 1, 1995.*
- Frequency of curbside Blue Box collection is at least half that of curbside garbage collection. For example, if garbage is picked up once a week, then recyclables must be picked up within at least every two weeks.

Materials to be collected by municipal source separation (recycling) programs

BASIC LIST *All materials mandatory*	*SUPPLEMENTARY LIST* *At least two materials are mandatory*	*ADDITIONAL MATERIALS*
- Newsprint - Food and beverage containers made of: • aluminum • glass • steel • PET	- Aluminum foil - Boxboard and paper board - Corrugated cardboard - Fine paper - Foam plastics - Magazines - Plastic film - Paper cups and plates - Rigid plastic containers - Telephone directories - Textiles (excluding fibreglass, carpet)	- Brick - Concrete - Glass - Gypsum - Leather - Metal - Paper - Plastic - Textiles - Wood

- All recyclable materials on the basic list are collected plus at least two materials from the supplementary list. A municipality may include additional materials from a schedule of source separated materials in the regulations. Commingling, that is, collecting separated materials in a common compartment, is allowed.
- Measures are implemented to ensure materials are separated properly.
- Collected recyclables are transported to a municipal waste recycling site, to an end-user, a distributor who sends the materials to end-users, or to a waste disposal site.
- Reasonable efforts are made to ensure that the collected materials are recycled.
- Residents are provided with instructions on proper procedures for source separation and feedback on how much material is being diverted from landfill. A communications program should also encourage residents to participate in the recycling program.
- An annual report is submitted to the ministry, describing types and amounts of materials collected and diverted from disposal.

Backyard composting programs

Municipalities with a population of 5,000 or more will be required to implement a residential backyard composting program. The program must include the following:

- The provision of home composters to residents by the municipality at cost or less.
- The provision of information to residents publicizing the availability of home composters and explaining their proper use and installation. A communications program should also encourage home composting.

Leaf and yard waste collection and composting

Municipalities with a population of 5,000 or more will be required to compost leaf and yard wastes if they currently have a collection program for these materials. Municipalities with a population of 50,000 or more will be required to implement a leaf and yard waste collection system, even if one is not currently in place, and compost the collected materials. A leaf and yard collection and composting program must include the following:

- Curbside collection of leaf and yard waste, or the provision of depots for receiving leaf and yard wastes, or a combination of both.
- Transportation of the leaf and yard waste to a leaf and yard waste composting site.
- The provision of a leaf and yard waste composting site or the services of another such site.
- Reasonable efforts are made to ensure that the compost produced is used as a soil conditioner.
- Collected leaf and yard wastes are composted at a leaf and yard composting site or other composting site, applied directly to land by the operator of the system, or transported to a person who will directly apply the materials to land.
- The capacity of the leaf and yard waste system must be sufficient to deal with the anticipated quantity of leaf and yard waste.
- A communications program is implemented to promote public participation in leaf and yard composting programs.
- An annual report is submitted to the Ministry of Environment and Energy, describing the leaf and yard system and the amount of waste collected, accepted, composted or applied to land.

IC&I WASTE REDUCTION PROGRAMS

Major IC&I waste generators

As described in the table on page 6, major waste generators are large establishments in designated industrial, commercial and institutional sectors. They represent large, non-residential sources of waste.

A large establishment within an IC&I sector is designated based on minimum size criteria such as building area or number of employees. Any establishment which is equal to or above the minimum size criteria must implement waste audits, waste reduction workplans and a source separation program.

In addition, owners of multi-unit residential buildings with six or more dwelling units are required to implement a source separation program.

Waste audits and waste reduction workplans

Doing a waste audit and preparing a reduction workplan are two complementary activities that deal with the measurement and reduction of waste.

Waste audits

A waste audit is a study that addresses the amount, nature and composition of waste and the manner by which it gets produced, including the extent to which materials or products used or sold consist of recycled or reused material.

The audit also assesses management decisions and policies that relate to the production of waste such as procurement policies and specifications for raw materials, supplies and equipment. The audit looks at the reasons for the policies and how they can be modified to facilitate 3Rs actions and assists the generator in identifying opportunities to introduce 3Rs activities.

If the designated waste generator is responsible for several establishments with similar activities – for example a restaurant chain or schools under a school board – then a single waste audit can be conducted.

The initial waste audit must be updated annually. A new owner or operator of a facility is not required to conduct a new waste audit if an audit was prepared by a previous owner or operator.

Waste reduction workplans

A waste reduction workplan consists of an organized set of activities developed in response to the information gathered during the waste audit. The plan must include reasonable ways to reduce, reuse and recycle waste, responsibilities for implementation, timing and expected results.

The workplan also must be updated on an annual basis. If objectives are not met, the reasons can be determined and evaluated in the annual workplan review. Suitable modifications to the workplan can then be implemented.

As part of its implementation, the workplan is communicated to employees or people who work at a particular facility. A summary of the plan is posted so that it is visible to employees. Both the waste audit and the waste reduction workplan must be kept on file for five years.

NOTE: Construction and demolition projects started before the regulation came into force have a compliance deadline of six months to implement the waste audit and workplan requirements. However, the audit and the workplan need not cover waste generated during this six-month period. As well, projects completed before the end of the six-month period are exempt from the waste audit and workplan requirements.

Source separation (recycling) programs

Designated major IC&I waste generators are required to implement a source separation program for specified recyclable materials which can reasonably be anticipated. Additional materials may be included from the schedules of source separated materials which apply to municipal source separation programs (see page 3).

As part of the source separation program, collection, handling and storage facilities must be provided for these materials. The generator must make reasonable efforts to ensure full use of the program and that source separated materials are reused or recycled.

The source separation program also must have a communications component to instruct employees and users of the program on how to source separate, which materials are to be collected and in what form the materials must be prepared. The communications

MAJOR IC&I WASTE GENERATORS DESIGNATED UNDER THE 3RS REGULATIONS

IC&I FACILITY/PROJECT	*MINIMUM SIZE*
RETAIL SHOPPING ESTABLISHMENTS applies to owner of establishment that sells goods or services at retail to persons who come to the establishment	10,000+ m^2 in floor area or occupies space in a designated retail complex and solely responsible for its own waste management
RETAIL SHOPPING COMPLEXES applies to owner of a complex that contains premises occupied by retail shopping establishments	10,000+ m^2 in total floor area
CONSTRUCTION PROJECTS applies to person who, on his/her own behalf or on behalf of another person, undertakes construction of one or more buildings including residential, industrial, commercial or institutional buildings.	Construction projects 2,000+ m^2 in total floor area
DEMOLITION PROJECTS applies to person who, on his/her own behalf or on behalf of another person, undertakes demolition of one or more buildings including residential, industrial, commercial or institutional buildings.	Demolition projects 2,000+ m^2 in total floor area
OFFICE BUILDINGS applies to owner of building used for offices	10,000+ m^2 in total floor area for offices
* *RESTAURANTS* applies to owner of a restaurant, including take-out, where food or beverages are prepared on site and offered for immediate sale to the public; does not apply to restaurants which co-operate in waste audits in retail complexes, office buildings, hotels/motels, hospitals, educational institutions.	10+ full-time employees and/or equivalent in part-time employees.
HOTELS AND MOTELS applies to owners of facilities with sleeping accommodations for temporary stays, including inns, resorts or hostels.	75+ units
HOSPITALS applies to operators of hospitals as defined under the *Public Hospitals Act*	Class A, B or F in Regulation 964, RRO 1990.
* *EDUCATIONAL INSTITUTIONS* applies to operators of public and private elementary, secondary, or vocational schools; training academies; colleges and universities; also any business facilities that are used for education	350+ enrolled students during calendar year at a location or campus
* *MANUFACTURING ESTABLISHMENTS* applies to owners of a manufacturing establishment	100+ full-time employees and/or equivalent in part-time employees.

* Designated facilities which drop below the minimum size in a calendar year remain designated under the regulations for another two years.

component also provides information to promote the program and feedback on the amounts of materials diverted as a result of the program.

Multi-unit residential buildings
Owners of multi-unit residential buildings, with six or more dwelling units, are required to provide a source separation program. The materials to be collected include: food and beverage containers made of aluminum, glass, steel or PET; newsprint; and other types of materials which are collected in the local municipal Blue Box program.

MATERIALS TO BE SOURCE SEPARATED BY DESIGNATED MAJOR IC&I WASTE GENERATORS

Facilities/projects	*Materials to be source separated*
Construction projects	corrugated cardboard, wood, drywall, steel, concrete, brick
Demolition projects	wood, steel, concrete, brick
Manufacturing establishments	corrugated cardboard, wood, steel, fine paper, newsprint, aluminum, glass, plastic *
Retail shopping establishments and complexes, office buildings, hospitals, education institutions	corrugated cardboard, fine paper, newsprint, and food and beverage containers made of aluminum, glass or steel
Hotels, motels, restaurants	corrugated cardboard, fine paper, newsprint, and food and beverage containers made of aluminum, glass, PET or steel

* HDPE jugs, pails, crates, drums; LDPE film; EPS foam; PS trays, reels, spools

PACKAGING REDUCTION PROGRAMS

Packaging refers to all materials used to protect, contain or transport a product. It also includes materials which are physically attached to a product or its container for the purposes of marketing and communications.

The regulation designates *major packaging users* to conduct *packaging audits* and *packaging reduction workplans*. The audit and the reduction workplan account for all the types and amounts of packaging in the user's products.

Major packaging users

Large establishments in four manufacturing sectors, and importers of products in these same sectors have been designated as major packaging users.

DESIGNATED MAJOR PACKAGING USERS

*MAJOR PACKAGING USER **	*MINIMUM SIZE*
Food manufacturing establishments Beverage manufacturing establishments Paper and allied product industry establishments** Chemical and chemical product industry establishments	100+ full-time employees and/or equivalent part-time employees
Importers	$ 20,000,000+ cost to importer of the food, beverage, paper or chemical categories in the previous calendar year.

* Designated packaging users which drop below the minimum size in a calendar year remain designated under the regulations for another two years; importers for another three years.

** Not including printed material

Packaging audit

A *packaging audit* is an examination of the impact of packaging on waste management needs, activities and opportunities. More specifically, the packaging audit must address the following:

- Practices for obtaining and using packaging.
- Types and quantities of packaging used in the products.
- Reusability or recyclability of a particular choice of packaging.
- Extent of reused packaging.
- Recycled content of packaging.
- Environmental impact of packaging that becomes waste.

The audit identifies the links between these activities. For example, practices for obtaining and using packaging influence the design, specification and selection criteria that determine the type and amount of packaging used. The audit helps determine which of the factors in these practices can incorporate 3Rs.

Finally, the audit examines the fate of packaging following its normal distribution pattern. This accounts for the amount of packaging which is reused, recycled or disposed of after it has reached the consumer.

Packaging reduction workplan

The *packaging reduction workplan* uses information collected from the audit to reduce the amount of waste resulting from packaging. The workplan evaluates the opportunities for 3Rs implementation highlighted by the audit.

The workplan must include, to the extent that is reasonable, actions which help to ensure:

- A reduction in the amount of packaging used.
- An increase in reused or recycled content of the packaging used.
- An increase in the reusability and recyclability of the packaging used.
- A reduction in the environmental impact of packaging that becomes waste.
- A reduction in the burden of waste on consumers.

The workplan must identify implementation responsibilities, timing and expected results. A review of the audit and workplan must be done at least every two years. Suitable modifications to the workplan can then be implemented. A summary of the workplan must be posted so that it is visible to employees. The packaging audit and packaging reduction workplan must be submitted, on request, to the Ministry of Environment and Energy within seven days of the request.

Additional rules for designated manufacturers

Manufacturers of brand-name products under licence or other contractual arrangements with an owner of the brand name, shall seek the co-operation of the brand-name owner in the preparation of a packaging reduction workplan. The workplan must identify the names of the persons from whom the manufacturer sought co-operation, and a description of the co-operation received.

Additional rules for designated importers

In preparing a packaging reduction workplan, an importer must consider changing buying policies and seeking the co-operation of the persons from whom the importer buys products. The workplan must identify the names of the persons from whom the importer sought co-operation, and a description of the co-operation received.

Recycling facilities

The *3Rs regulations* will make it easier to establish a recycling site for source separated waste, while maintaining strong safeguards for protecting the environment. This will also accelerate the development of recycling capacity and complement other regulatory measures for municipal and IC&I recycling programs.

New approvals process

Currently, Part V of the *Environmental Protection Act* (EPA) requires all sites which handle waste, whether they process it or dispose of it, to obtain a Certificate of Approval. Recycling facilities also require a Certificate of Approval because they handle materials which are wastes or are derived from wastes.

Under the new *3Rs regulations*, a recycling site or depot is exempt from obtaining a Certificate of Approvals for waste disposal if the proponent meets certain siting requirements. As well, certain operating requirements must be met once the recycling site is in operation. Failure to meet these requirements would be an offence under the *Environmental Protection Act*.

The regulations designate three types of recycling facilities: *municipal waste recycling sites, leaf and yard waste composting sites and municipal waste recycling depots*.

Municipal waste recycling sites

A *municipal waste recycling site* is a facility that accepts only materials (source separated or commingled), as listed in the schedules of source separated waste in the *3Rs regulations*, and transfers them, with or without processing, to secondary material markets for recycling into new products. Processing activities can include only: sorting, grading, sizing, cleaning, drying, deinking, size reduction, pulping, composting, baling, packaging or pelletizing.

To be exempt from obtaining a waste disposal site Certificate of Approval, a municipal waste recycling site must have all buildings, processing and storage areas at least 50 metres from its property line.

Operational requirements

- Processed materials must be shipped directly to a user of the materials, a distributor, another municipal waste recycling site or a waste disposal site.
- Amount of materials allowed on site must, if there is processing:
  - be no more than 15 times the capacity for material that the site is designed to process on a daily basis; and
  - total amount of incoming, outgoing, and in process materials must not exceed three times the monthly processing capacity or 2000 m^3, whichever is greater
- No more than 2000 m^3 of materials are allowed on site if there is no processing capacity.
- Residual or leftover waste from processing recyclables must be less than 10 per cent of the dry weight of incoming waste materials averaged over a six-month period; and must be removed promptly for disposal.
- Reasonable care must be exercised to control dust, litter, odour, noise, rodents and other pests.
- Specific site plans, operational plans, emergency response plans and contingency plans must be developed and kept at the site until it ceases to operate.
- Records,which must be maintained on site for at least two years, must detail the types, quantities, sources, markets, processing and treatment of materials.
- Signs must be posted in prominent locations showing hours of business, owner's name and emergency telephone number.
- Only trained employees may be allowed to operate and maintain equipment; all employees must be trained in emergency procedures.
- Waste cannot begin to be accepted at the site unless, at least 90 days prior to its receipt, written notice has been given to the clerk of the municipality (local or upper tier), property owners within 120 m of the site, and the Ministry of Environment and Energy. But if the site does not *actually* begin operation within 180 days after the initial start-up notice is given, a new notice is

required.

- Reasonable care must be exercised to prevent access by unauthorized persons.
- All site areas for roads, parking, loading and unloading must be maintained in good condition.
- Municipal waste recycling sites owned by or operated on behalf of a municipality also must submit annual reports to the ministry, describing the amount of materials accepted at the site, the amount reused or recycled, and the amount of residual wastes sent to disposal.

Leaf and yard waste composting sites

Leaf and yard waste composting sites are the central facilities to which source separated leaf and yard materials are accepted only for composting. The wastes that the sites accept are limited to common lawn and garden materials, such as leaves, brush, tree trimmings or grass clippings. Food wastes from the kitchen are not allowed.

A leaf and yard waste composting site is exempt from obtaining a Certificate of Approval for *waste disposal* and for *air emissions*, if buildings, processing areas and storage areas are located at least 100 metres from the site boundary and any body of water or water course. Once in operation, the site must meet certain requirements. There are also specific quality control requirements for the use of the finished compost.

Operational requirements

- Most operational requirements that apply to municipal waste recycling sites apply also to leaf and yard composting sites.
- Leaf and yard waste may be stored for no more than four days before it is composted. Total amount of compost on site shall not exceed 18 times the capacity for material that the site is designed to process in a month.
- Temperature of the compost mass in an aerated static pile or windrow composting system must be at least 55° C for at least 15 days; and at least 55° C for at least three days in an in-vessel system.
- Windrow must be turned at least five times at regular intervals after the temperature reaches 55° C; the temperature must be maintained after the fifth turning.
- There must be a six-month curing period; during this period the compost mass must be turned at least once a month.
- Records which must be maintained for at least three years must include daily temperatures of the composting mass (weekly while curing), operational and processing procedures, public complaints and responses, and laboratory analysis of samples; records for each shipment of finished compost, which must be maintained for at least 10 years, must include the name, address, and telephone number of each person who receives the shipment.
- Finished compost must be sampled and analyzed before leaving the site.

Use of finished compost material

To ensure the finished compost is put to the best end use, the regulation allows for three categories of use: unrestricted, controlled, and disposal as waste. The allowable end use is determined by the quality of the finished compost. The quality is measured by analyzing for the concentrations of certain metals and non-organic matter.

- Unrestricted use: Finished compost meets strict quality criteria and is not subject to the EPA. This compost may be freely used in an agricultural or gardening activity.
- Controlled use: Finished compost meets less strict quality criteria. This compost is designated a waste under the EPA and can be used only under prescribed conditions without a Part V approval. The uses are restricted to limited urban land applications which will not elevate soil metals content beyond specified concentrations or as cover material for landfills.
- Disposal: Finished compost is a waste if it fails to meet the quality criteria. This compost can only be disposed of at certified waste disposal sites.

Municipal waste recycling depots

Municipal waste recycling depots are locations at which an owner will accept source separated materials but does not process any of the materials. The operator will simply provide containers into which materials are deposited and once full the containers are transported to other recycling sites. Recycling depots typically serve the general public and are a common part of a small municipality's source separation system.

To be exempt from obtaining a waste disposal site Certificate of Approval, a municipal waste recycling depot must have all buildings and storage areas at least 50 metres from its property line.

Operational requirements

The following requirements apply to municipal recycling depots:

- Only recyclable materials listed in the schedules to the regulation are accepted and may be transferred only to:
  - Municipal waste recycling site
  - End-user
  - Distributor
  - Waste disposal site
- Signs must be posted instructing the public on what materials are accepted, how they must be source separated and where they must be deposited. The signs also must identify the person who is responsible for the depot and provide contact names and telephone numbers.
- Suitable number and type of containers, and proper security, litter control and collection schedule must be maintained.

Other exemptions from Part V, *Environmental Protection Act*

Integrated recycling sites

These are municipal waste recycling sites located at a manufacturing facility that uses the output of the recycling site in its manufacturing process. These sites are exempt from Part V, *Environmental Protection Act*.

Municipal waste recycling depots

All municipal waste recycling depots with a total waste storage capacity of less than 200 m^3 are exempt from Part V, EPA and the *3Rs regulations*. All waste at these sites must be removed at least every thirty days.

Source separated recyclable materials

Source separated materials (not commingled) that are shipped directly from a waste generator to an end user are exempt from Part V, EPA, and Regulation 347. In other words, these materials are not considered to be waste. They are incorporated into a finished product at the site where they are received.

For more information

- To help you answer questions on the 3Rs regulations: call 323-5898 in the Toronto dialling area or 1-800-565-4860 toll free long distance.
- To order unofficial copies of the 3Rs regulations, more copies of this backgrounder or copies of the forthcoming compliance guides (available August 1993), complete the enclosed reply card and mail to:

> *3Rs REGULATIONS*
> Ministry of Environment and Energy
> Communications Branch
> 135 St. Clair Ave. W., 2nd floor
> Toronto, Ontario M4V 1P5

PIBS 2474e *Revised*
Printed on recycled paper

Ministry of Environment and Energy

FOR YOUR information

MARCH 1994

A regulation to prevent the release of fluorocarbon refrigerants

EROSION OF THE OZONE LAYER

The ozone layer, located in the upper reaches of the earth's atmosphere, normally screens out the sun's harmful UV rays before they reach the earth's surface and our skin. Over the past 20 years, this layer of protection has shrunk by an estimated five to ten per cent due to man-made ozone-depleting substances, including fluorocarbons. Many of these fluorocarbons - the most common being chlorofluorocarbons (CFCs) - are released when refrigeration and air conditioning equipment is repaired or discarded.

As of March 29, 1994, a new regulation to prevent the release of fluorocarbon refrigerants is in effect in Ontario. Implementation of the regulation includes a training and certification program.

NEW REGULATION IN EFFECT AS OF MARCH 29, 1994

Designated refrigerants and refrigeration equipment

This regulation applies to refrigeration equipment containing chlorofluorocarbons (CFCs), hydrochorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs).

"Refrigeration equipment" includes mobile and stationary air conditioning (A/C) systems, heat pumps, refrigerators and freezer units.

Who's affected?

- Those who repair and refill refrigeration equipment such as service technicians in the automotive, appliance and HVAC (heating, ventilation and air conditioning) industries;
- Those who sell fluorocarbon refrigerants such as refrigerant producers and wholesalers selling refrigerants to automotive and appliance manufacturing and service companies;
- Those who collect used refrigeration equipment for disposal and recycling such as municipal waste management and public works departments, salvage companies, and retailers who take back old refrigerators and air conditioners as a convenience to their customers;
- Those who own refrigeration equipment such as homeowners, car and truck owners, building owners and business owners.

The handling of flurocarbon refrigerants and the servicing of refrigeration equipment

Effective immediately

- The venting of refrigerants into the natural environment is prohibited, including for most testing purposes. Collection or recycling are the only legal alternatives to venting.
- You cannot add a refrigerant to equipment to test for leaks if the refrigerant has the potential to escape into the environment. There are two exceptions: (a) the testing of air conditioning systems in a motor vehicle done in accordance with

Society of Automotive Engineers procedure SAE J1628 and using equipment complying with standard SAE J1627; (b) servicing or testing which takes place in the course of the manufacture of a product which is or which contains refrigeration equipment.

Effective October 1, 1994

- You must become certified and have in your possession an Ozone Depletion Prevention (ODP) Card to handle, service and repair refrigeration equipment containing fluorocarbon refrigerants. You will also need to have this card to purchase refrigerants. This card indicates that you have completed a course on the proper procedure for handling fluorocarbon refrigerants. The requirements for certification change on January 1, 1998. See below *Who needs to be certified to handle refrigerants and service refrigeration equipment?*
- A certified person must tag all refrigeration equipment that has been leak tested or drained, and notify the owner or operator of the equipment. You or your company must keep a record of each notice for three years. The tag must indicate your name, your ODP card number and expiry date, the date of servicing, and the results of the test you performed. If there is a leak, a statement must be included that no refrigerant should be added to the equipment until the leak is repaired. It is illegal to remove a tag unless it is to be replaced by a new one.
- You can refill refrigeration equipment only if it has been tagged within the past six months as "leak free" and if it appears to be undamaged. The only two exceptions are: (a) at a health care facility, if there is an immediate danger to human life or health; and (b) at a farm, food packaging, processing or storage facility, if there is immediate danger to crops, foodstuffs, or plant and animal life. In either of these two exceptions, you must immediately notify the Ministry of Environment and Energy. You must also test the equipment for leaks immediately and, within seven days, ensure that the leaks are fixed and that the ministry is notified of your actions.

Who needs to be certified to handle refrigerants and service refrigeration equipment?

- If you repair and refill refrigeration equipment, then you have until October 1, 1994, to obtain an Ozone Depletion Prevention (ODP) card. To obtain this card you must complete a course and examination on the proper procedure for handling fluorocarbon refrigerants approved by the Ministry of Environment and Energy.
- The ODP card will be valid until December 31, 1997. Prior to that date, you can renew your ODP card by taking a ministry-approved examination on the handling of ozone-depleting substances, refrigerant and refrigeration equipment.
- Over the next three years, the handling of refrigerants will become incorporated into the training of fuel and electrical systems mechanics, motor vehicle mechanics, and refrigeration and air-conditioning mechanics. As of January 1, 1998, if you become legally certified in Ontario to work in one of these trades you will be automatically considered to be certified to handle refrigerants and service refrigeration equipment. You will *not* be required to obtain an ODP card.

For vendors of fluorocarbon refrigerants

As of July 1, 1994

- If you sell fluorocarbon refrigerants, you must charge a minimum $25 deposit on all storage containers filled with a fluorocarbon refrigerant. You must take back every used container originally sold by you and refund the deposit.

As of October 1, 1994

- You can only sell fluorocarbon refrigerants in refillable or recyclable storage containers to wholesalers, certified persons with an ODP card, or any person who employs someone with an ODP card.
- You must keep a record of every sale of a storage container of fluorocarbon refrigerant for at least three years after the date of sale.

These requirements do not apply to manufacturers of fluorocarbon refrigerants who deposit the refrigerant directly into a tank vehicle or refrigeration equipment.

As of January 1, 1995

- You can sell fluorocarbon refrigerants only in storage containers which are both refillable *and* recyclable.

The use and disposal of refrigerant containers

Effective immediately

- You cannot dispose of a refrigerant container in a landfill or dump.

As of October 1, 1994

- All refrigerant containers must be properly labelled, indicating the name of the refrigerant, if the container is refillable or recyclable or both, where it can be returned for deposit refund, and that it cannot be disposed of in a dump or landfill.
- A refrigerant container can be dismantled, destroyed or recyled only if it has been properly tagged as empty by a certified person with an ODP card. A record of the tag must be kept for three years.
- Every person who owns a container that has contained a refrigerant shall make all reasonable efforts to refill or recycle the container.

The management and disposal of refrigeration equipment

As of October 1, 1994

- Non-household refrigeration equipment (including car A/C systems) cannot be dismantled, destroyed, incinerated, or disposed of at a dump or landfill site, unless it has been tagged by a certified person to be empty of refrigerant. This requirement does not apply to dismantling during the manufacture of refrigeration equipment or products which contain refrigeration equipment.

As of December 1, 1995

- The above prohibition applies to household refrigeration equipment as well.

Refrigerants in vehicle A/C systems

As of December 31, 1995

New model cars, trucks and other motor vehicles will no longer be fitted with air conditioning units that contain CFCs and HCFCs. However, A/C systems with CFCs and HCFCs in service prior to that date may continue to be used. Only recycled CFCs and HCFCs will be available for servicing these systems.

FOR MORE INFORMATION

To register for a ministry-approved training course call the Heating Refrigeration and Air Conditioning Institute of Canada at **1-800-661-3369** or **905-602-4700** in Toronto. Members of Local 787, Refrigeration Workers Union may register for a ministry-approved training course by calling **1-800-387-9121** or **905-790-1021** in the Toronto dialing area.

An official copy of the regulation can be ordered from Publications Ontario at 1-800-668-9938 or, in the Toronto dialing area, 326-5300.

To order more copies of this publication or other publications on environment and energy issues, call or write:

Public Information
Ministry of Environment and Energy
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
(416) 323-4321 or 1-800-565-4923

- Les vendeurs doivent conserver toutes les transactions de vente pendant une période d'au moins trois ans.

Ces règlements ne s'appliquent pas aux fabricants de frigorigènes fluorocarbonés qui transvasent le produit directement dans des camions-citernes ou des appareils de réfrigération.

En vigueur à compter du 1er janvier 1995

- Les bouteilles dans lesquelles sont vendus les frigorigènes fluorocarbonés doivent être réutilisables et recyclables.

L'emploi et l'élimination des bouteilles de frigorigène

En vigueur à compter du 29 mars 1994

- Il est interdit de jeter des bouteilles de frigorigène dans des dépotoirs et des lieux d'enfouissement.

En vigueur à compter du 1er octobre 1994

- Les bouteilles de frigorigène doivent être correctement étiquetées. L'étiquette doit porter le nom du frigorigène et mentionner que la bouteille ne peut être mise au rebut ni dans un dépotoir ni dans un lieu d'enfouissement. Elle doit aussi signaler si la bouteille est réutilisable ou recyclable et l'endroit où on peut la rapporter pour se faire rembourser la consigne.
- Seules peuvent être désassemblées, détruites ou recyclées les bouteilles dont l'étiquette atteste qu'elles sont vides. L'étiquette doit être posée par une personne titulaire d'une carte Ozone-Alerte. Les données doivent être conservées pendant trois ans.
- Quiconque possède une bouteille à frigorigène vide doit s'efforcer de la faire remplir à nouveau ou de la recycler.

L'élimination des appareils de réfrigération

En vigueur à compter du 1er octobre 1994

- Les appareils de réfrigération à usage non ménager (y compris les climatiseurs d'automobile) ne peuvent être ni désassemblés, ni détruits, ni incinérés, ni mis au rebut dans un lieu d'enfouissement s'ils ne portent pas une étiquette réglementaire attestant qu'ils ne contiennent pas de frigorigène. Ce règlement ne s'applique pas aux appareils qui sont désassemblés au cours de leur fabrication.

En vigueur à compter du 1er décembre 1995

- À compter du 1er décembre 1995, la disposition précédente s'étendra aussi aux appareils de réfrigération ménagers.

Les frigorigènes utilisés dans les climatiseurs d'automobile

En vigueur à compter du 31 décembre 1995

- À compter du 31 décembre 1995, les climatiseurs des nouveaux camions et véhicules automobiles ne contiendront plus de CFC ni de HCFC. L'emploi des climatiseurs en usage avant cette date continuera d'être permis, mais leur recharge ne pourra se faire qu'au moyen de CFC et de HCFC recyclés.

RENSEIGNEMENTS SUPPLÉMENTAIRES

Les personnes qui désirent s'inscrire au cours de formation requis pour obtenir la carte Ozone-Alerte sont priées de s'adresser à l'Institut canadien du chauffage, de la climatisation et de la réfrigération, au 1-800-661-3369 ou au 602-4700, à Toronto. Les membres du Syndicat des travailleurs en réfrigération, section locale 787, peuvent aussi composer le 905-790-1021 ou le 1-800-387-9121.

On peut obtenir la version officielle du règlement en s'adressant à Publications Ontario, au 1-800-668-9938. À Toronto, le numéro à composer est le 326-5300.

Pour obtenir d'autres exemplaires de la présente publication ou tout document ayant trait à l'énergie et à l'environnement, s'adresser au :

Centre d'information
Ministère de l'Environnement et de l'Énergie
135, avenue St. Clair ouest
Toronto (Ontario) M4V 1P5
Tél. : (416) 323-4321 (Toronto) ou 1-800-565-4923

Il est interdit d'utiliser un frigorigène pour vérifier si un appareil fuit lorsque le frigorigène utilisé risque de s'échapper dans l'environnement, sauf si : a) le climatiseur d'un véhicule automobile est soumis à une vérification conformément au procédé SAE J1628 de la *Society of Automotive Engineers* (US) et au moyen de matériel conforme à la norme SAE J1627; b) l'entretien ou la vérification se fait au cours de la fabrication d'un appareil de réfrigération ou d'un appareil contenant un frigorigène.

En vigueur à compter du 1er octobre 1994

- Les personnes qui assurent l'entretien et la réparation d'appareils de réfrigération contenant des frigorigènes fluorocarbonés doivent avoir en leur possession la carte Ozone-Alerte (*Ozone Depletion Prevention Card*) attestant qu'elles ont suivi un cours de formation les habilitant à manipuler des frigorigènes fluorocarbonés et à en faire l'achat. Les règles quant à l'obtention de la carte Ozone-Alerte changeront le 1er janvier 1998 (voir, ci-contre, la rubrique *Qui doit obtenir la carte Ozone-Alerte?*).
- Tout appareil de réfrigération ayant subi une vérification d'étanchéité ou ayant été vidé de ses gaz frigorigènes doit être étiqueté par une personne autorisée, et cette personne doit notifier le propriétaire ou l'utilisateur de l'appareil. La personne autorisée ou son employeur doit garder une copie de l'avis pendant au moins trois ans. L'étiquette doit porter le nom du technicien, le numéro de sa carte Ozone-Alerte, la date d'expiration de la carte, la date à laquelle a eu lieu la vérification et le résultat de celle-ci. Si l'appareil présente une fuite, il faut mentionner sur l'étiquette qu'il est interdit d'y introduire un frigorigène tant qu'il n'aura pas été réparé. Il est interdit d'enlever une étiquette, sauf si elle est remplacée par une nouvelle étiquette.
- Seuls peuvent être rechargés les appareils qui ont été attestés « sans fuite » au cours des six derniers mois et qui ne semblent pas être endommagés, sauf en ce qui concerne les deux exceptions suivantes :
  a) les établissements de santé, lorsque le respect de cette condition poserait un danger imminent à la santé ou à la vie humaine; b) les fermes d'élevage, les fermes agricoles et les installations d'emballage, de traitement ou d'entreposage de denrées périssables, lorsque le respect de cette condition poserait un danger imminent à la vie d'animaux ou des risques imminents d'avarie à des denrées périssables, y compris des produits agricoles et des végétaux. Si un appareil est rechargé en vertu de l'une ou l'autre des exceptions susmentionnées, il faut le signaler sans tarder au ministère de l'Environnement et de l'Énergie. Il faut aussi vérifier si l'appareil fuit et, le cas échéant, le réparer et en informer le Ministère dans les sept jours qui suivent.

Qui doit obtenir la carte Ozone-Alerte?

- Les personnes qui effectuent la réparation ou la recharge d'appareils de réfrigération ont jusqu'au *1er octobre 1994* pour obtenir la carte Ozone-Alerte attestant qu'elles ont réussi un cours de formation les habilitant à manipuler des frigorigènes.
- La carte Ozone-Alerte sera valide jusqu'au 31 décembre 1997. Il sera possible de la renouveler avant cette date en suivant de nouveau un cours de formation approuvé par le ministère de l'Environnement et de l'Énergie.
- Au cours des trois prochaines années, la formation des mécaniciens de véhicules automobiles et des techniciens en réfrigération comprendra un cours sur la manipulation des frigorigènes. À compter du 1er janvier 1998, les personnes qui obtiennent en Ontario un brevet d'aptitude professionnelle relativement à l'un de ces métiers seront habilitées à manipuler des frigorigènes et à effectuer l'entretien d'appareils de réfrigération. Ces personnes n'auront pas à obtenir la carte Ozone-Alerte.

La vente de frigorigènes fluorocarbonés

En vigueur à compter du 1er juillet 1994

- Les vendeurs doivent imposer une consigne d'au moins 25 $ sur toutes les bouteilles pleines qu'ils vendent. Ils doivent aussi s'engager à reprendre chacune des bouteilles de frigorigène qu'ils ont vendues et rembourser la consigne à l'acheteur.

En vigueur à compter du 1er octobre 1994

- Les frigorigènes fluorocarbonés doivent être vendus uniquement à des grossistes ou à des personnes titulaires d'une carte Ozone-Alerte ou à leur employeur. Les frigorigènes doivent en outre être vendus dans des bouteilles réutilisables ou recyclables.

Ministère de l'Environnement et de l'Énergie

Le point sur...

MARS 1994

Le règlement sur l'emploi des frigorigènes fluorocarbonés

APPAUVRISSEMENT DE LA COUCHE D'OZONE

La couche d'ozone stratosphérique parvient généralement à absorber les rayons ultraviolets du Soleil avant que leurs effets destructeurs ne soient ressentis sur la Terre. Au cours des vingt dernières années, ce « bouclier protecteur » qu'est la couche d'ozone s'est appauvri d'environ cinq à dix pour cent. Des substances synthétiques, notamment les fluorocarbures, en sont la cause. Ces substances dites « destructrices d'ozone », dont les plus connues sont les chlorofluorocarbures, ou CFC, sont libérées dans l'atmosphère lorsque des appareils de réfrigération ou de climatisation sont réparés ou mis au rebut.

Le nouveau règlement sur l'emploi des frigorigènes chlorofluorocarbonés entre en vigueur le 29 mars 1994. Le règlement comprend des dispositions quant à l'accréditation des techniciens en réfrigération.

NOUVEAU RÈGLEMENT EN VIGUEUR LE 29 MARS 1994

Le règlement s'étend aux appareils de réfrigération contenant des chlorofluorocarbures (CFC), des hydrochlorofluorocarbures (HCFC) ou des hydrofluorocarbures (HFC).

Sont désignés sous la rubrique « appareils de réfrigération », en autres, les appareils de climatisation mobiles ou fixes, les thermopompes, les réfrigérateurs et les congélateurs.

Qui est visé?

Le règlement vise :

- quiconque fait la réparation et la recharge d'appareils de réfrigération, par exemple les techniciens des secteurs de l'automobile ainsi que les réparateurs d'appareils ménagers et d'appareils de chauffage, de ventilation et de climatisation;
- quiconque vend des frigorigènes fluorocarbonés, par exemple les fabricants de frigorigènes et les grossistes qui fournissent les frigorigènes aux constructeurs automobiles, aux fabricants d'appareils ménagers et aux entreprises de services;
- quiconque récupère les vieux appareils de réfrigération en vue de les éliminer ou de les recycler, par exemple les services municipaux de gestion des déchets ou de travaux publics, les entreprises de récupération et les détaillants qui débarrassent leurs clients des vieux réfrigérateurs et climatiseurs;
- quiconque possède des appareils de réfrigération, par exemple les propriétaires de maisons, de véhicules, d'édifices et d'entreprises.

L'emploi de fluides frigorigènes et l'entretien d'appareils de réfrigération

En vigueur à compter du 29 mars 1994

Il est interdit de libérer des gaz frigorigènes dans l'atmosphère. Cette interdiction vaut également pour la plupart des essais faits pour vérifier le fonctionnement des appareils de réfrigération. Les seules autres solutions légales seront ou bien de recycler les frigorigènes, ou bien de les récupérer.

Ministry of Environment and Energy

FOR YOUR information

MARCH 1994

A regulation to prevent the release of fluorocarbon refrigerants

EROSION OF THE OZONE LAYER

The ozone layer, located in the upper reaches of the earth's atmosphere, normally screens out the sun's harmful UV rays before they reach the earth's surface and our skin. Over the past 20 years, this layer of protection has shrunk by an estimated five to ten per cent due to man-made ozone-depleting substances, including fluorocarbons. Many of these fluorocarbons - the most common being chlorofluorocarbons (CFCs) - are released when refrigeration and air conditioning equipment is repaired or discarded.

As of March 29, 1994, a new regulation to prevent the release of fluorocarbon refrigerants is in effect in Ontario. Implementation of the regulation includes a training and certification program.

NEW REGULATION IN EFFECT AS OF MARCH 29, 1994

Designated refrigerants and refrigeration equipment

This regulation applies to refrigeration equipment containing chlorofluorocarbons (CFCs), hydrochorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs).

"Refrigeration equipment" includes mobile and stationary air conditioning (A/C) systems, heat pumps, refrigerators and freezer units.

Who's affected?

- Those who repair and refill refrigeration equipment such as service technicians in the automotive, appliance and HVAC (heating, ventilation and air conditioning) industries;
- Those who sell fluorocarbon refrigerants such as refrigerant producers and wholesalers selling refrigerants to automotive and appliance manufacturing and service companies;
- Those who collect used refrigeration equipment for disposal and recycling such as municipal waste management and public works departments, salvage companies, and retailers who take back old refrigerators and air conditioners as a convenience to their customers;
- Those who own refrigeration equipment such as homeowners, car and truck owners, building owners and business owners.

The handling of flurocarbon refrigerants and the servicing of refrigeration equipment

Effective immediately

- The venting of refrigerants into the natural environment is prohibited, including for most testing purposes. Collection or recycling are the only legal alternatives to venting.
- You cannot add a refrigerant to equipment to test for leaks if the refrigerant has the potential to escape into the environment. There are two exceptions: (a) the testing of air conditioning systems in a motor vehicle done in accordance with

Society of Automotive Engineers procedure SAE J1628 and using equipment complying with standard SAE J1627; (b) servicing or testing which takes place in the course of the manufacture of a product which is or which contains refrigeration equipment.

Effective October 1, 1994

- You must become certified and have in your possession an Ozone Depletion Prevention (ODP) Card to handle, service and repair refrigeration equipment containing fluorocarbon refrigerants. You will also need to have this card to purchase refrigerants. This card indicates that you have completed a course on the proper procedure for handling fluorocarbon refrigerants. The requirements for certification change on January 1, 1998. See below *Who needs to be certified to handle refrigerants and service refrigeration equipment?*
- A certified person must tag all refrigeration equipment that has been leak tested or drained, and notify the owner or operator of the equipment. You or your company must keep a record of each notice for three years. The tag must indicate your name, your ODP card number and expiry date, the date of servicing, and the results of the test you performed. If there is a leak, a statement must be included that no refrigerant should be added to the equipment until the leak is repaired. It is illegal to remove a tag unless it is to be replaced by a new one.
- You can refill refrigeration equipment only if it has been tagged within the past six months as "leak free" and if it appears to be undamaged. The only two exceptions are: (a) at a health care facility, if there is an immediate danger to human life or health; and (b) at a farm, food packaging, processing or storage facility, if there is immediate danger to crops, foodstuffs, or plant and animal life. In either of these two exceptions, you must immediately notify the Ministry of Environment and Energy. You must also test the equipment for leaks immediately and, within seven days, ensure that the leaks are fixed and that the ministry is notified of your actions.

Who needs to be certified to handle refrigerants and service refrigeration equipment?

- If you repair and refill refrigeration equipment, then you have until October 1, 1994, to obtain an Ozone Depletion Prevention (ODP) card. To obtain this card you must complete a course and examination on the proper procedure for handling fluorocarbon refrigerants approved by the Ministry of Environment and Energy.
- The ODP card will be valid until December 31, 1997. Prior to that date, you can renew your ODP card by taking a ministry-approved examination on the handling of ozone-depleting substances, refrigerant and refrigeration equipment.
- Over the next three years, the handling of refrigerants will become incorporated into the training of fuel and electrical systems mechanics, motor vehicle mechanics, and refrigeration and air-conditioning mechanics. As of January 1, 1998, if you become legally certified in Ontario to work in one of these trades you will be automatically considered to be certified to handle refrigerants and service refrigeration equipment. You will *not* be required to obtain an ODP card.

For vendors of fluorocarbon refrigerants

As of July 1, 1994

- If you sell fluorocarbon refrigerants, you must charge a minimum $25 deposit on all storage containers filled with a fluorocarbon refrigerant. You must take back every used container originally sold by you and refund the deposit.

As of October 1, 1994

- You can only sell fluorocarbon refrigerants in refillable or recyclable storage containers to wholesalers, certified persons with an ODP card, or any person who employs someone with an ODP card.
- You must keep a record of every sale of a storage container of fluorocarbon refrigerant for at least three years after the date of sale.

These requirements do not apply to manufacturers of fluorocarbon refrigerants who deposit the refrigerant directly into a tank vehicle or refrigeration equipment.

As of January 1, 1995

- You can sell fluorocarbon refrigerants only in storage containers which are both refillable *and* recyclable.

The use and disposal of refrigerant containers

Effective immediately

- You cannot dispose of a refrigerant container in a landfill or dump.

As of October 1, 1994

- All refrigerant containers must be properly labelled, indicating the name of the refrigerant, if the container is refillable or recyclable or both, where it can be returned for deposit refund, and that it cannot be disposed of in a dump or landfill.
- A refrigerant container can be dismantled, destroyed or recyled only if it has been properly tagged as empty by a certified person with an ODP card. A record of the tag must be kept for three years.
- Every person who owns a container that has contained a refrigerant shall make all reasonable efforts to refill or recycle the container.

The management and disposal of refrigeration equipment

As of October 1, 1994

- Non-household refrigeration equipment (including car A/C systems) cannot be dismantled, destroyed, incinerated, or disposed of at a dump or landfill site, unless it has been tagged by a certified person to be empty of refrigerant. This requirement does not apply to dismantling during the manufacture of refrigeration equipment or products which contain refrigeration equipment.

As of December 1, 1995

- The above prohibition applies to household refrigeration equipment as well.

Refrigerants in vehicle A/C systems

As of December 31, 1995

New model cars, trucks and other motor vehicles will no longer be fitted with air conditioning units that contain CFCs and HCFCs. However, A/C systems with CFCs and HCFCs in service prior to that date may continue to be used. Only recycled CFCs and HCFCs will be available for servicing these systems.

FOR MORE INFORMATION

To register for a ministry-approved training course call the Heating Refrigeration and Air Conditioning Institute of Canada at **1-800-661-3369** or 905-602-4700 in Toronto. Members of Local 787, Refrigeration Workers Union may register for a ministry-approved training course by calling **1-800-387-9121** or **905-790-1021** in the Toronto dialing area.

An official copy of the regulation can be ordered from Publications Ontario at 1-800-668-9938 or, in the Toronto dialing area, 326-5300.

To order more copies of this publication or other publications on environment and energy issues, call or write:

Public Information
Ministry of Environment and Energy
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
(416) 323-4321 or 1-800-565-4923

- Les vendeurs doivent conserver toutes les transactions de vente pendant une période d'au moins trois ans.

Ces règlements ne s'appliquent pas aux fabricants de frigorigènes fluorocarbonés qui transvasent le produit directement dans des camions-citernes ou des appareils de réfrigération.

En vigueur à compter du 1er janvier 1995

- Les bouteilles dans lesquelles sont vendus les frigorigènes fluorocarbonés doivent être réutilisables et recyclables.

L'emploi et l'élimination des bouteilles de frigorigène

En vigueur à compter du 29 mars 1994

- Il est interdit de jeter des bouteilles de frigorigène dans des dépotoirs et des lieux d'enfouissement.

En vigueur à compter du 1er octobre 1994

- Les bouteilles de frigorigène doivent être correctement étiquetées. L'étiquette doit porter le nom du frigorigène et mentionner que la bouteille ne peut être mise au rebut ni dans un dépotoir ni dans un lieu d'enfouissement. Elle doit aussi signaler si la bouteille est réutilisable ou recyclable et l'endroit où on peut la rapporter pour se faire rembourser la consigne.
- Seules peuvent être désassemblées, détruites ou recyclées les bouteilles dont l'étiquette atteste qu'elles sont vides. L'étiquette doit être posée par une personne titulaire d'une carte Ozone-Alerte. Les données doivent être conservées pendant trois ans.
- Quiconque possède une bouteille à frigorigène vide doit s'efforcer de la faire remplir à nouveau ou de la recycler.

L'élimination des appareils de réfrigération

En vigueur à compter du 1er octobre 1994

- Les appareils de réfrigération à usage non ménager (y compris les climatiseurs d'automobile) ne peuvent être ni désassemblés, ni détruits, ni incinérés, ni mis au rebut dans un lieu d'enfouissement s'ils ne portent pas une étiquette réglementaire attestant qu'ils ne contiennent pas de frigorigène. Ce règlement ne s'applique pas aux appareils qui sont désassemblés au cours de leur fabrication.

En vigueur à compter du 1er décembre 1995

- À compter du 1er décembre 1995, la disposition précédente s'étendra aussi aux appareils de réfrigération ménagers.

Les frigorigènes utilisés dans les climatiseurs d'automobile

En vigueur à compter du 31 décembre 1995

- À compter du 31 décembre 1995, les climatiseurs des nouveaux camions et véhicules automobiles ne contiendront plus de CFC ni de HCFC. L'emploi des climatiseurs en usage avant cette date continuera d'être permis, mais leur recharge ne pourra se faire qu'au moyen de CFC et de HCFC recyclés.

RENSEIGNEMENTS SUPPLÉMENTAIRES

Les personnes qui désirent s'inscrire au cours de formation requis pour obtenir la carte Ozone-Alerte sont priées de s'adresser à l'Institut canadien du chauffage, de la climatisation et de la réfrigération, au 1-800-661-3369 ou au 602-4700, à Toronto. Les membres du Syndicat des travailleurs en réfrigération, section locale 787, peuvent aussi composer le 905-790-1021 ou le 1-800-387-9121.

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Il est interdit d'utiliser un frigorigène pour vérifier si un appareil fuit lorsque le frigorigène utilisé risque de s'échapper dans l'environnement, sauf si : a) le climatiseur d'un véhicule automobile est soumis à une vérification conformément au procédé SAE J1628 de la *Society of Automotive Engineers* (US) et au moyen de matériel conforme à la norme SAE J1627; b) l'entretien ou la vérification se fait au cours de la fabrication d'un appareil de réfrigération ou d'un appareil contenant un frigorigène.

En vigueur à compter du 1er octobre 1994

- Les personnes qui assurent l'entretien et la réparation d'appareils de réfrigération contenant des frigorigènes fluorocarbonés doivent avoir en leur possession la carte Ozone-Alerte (*Ozone Depletion Prevention Card*) attestant qu'elles ont suivi un cours de formation les habilitant à manipuler des frigorigènes fluorocarbonés et à en faire l'achat. Les règles quant à l'obtention de la carte Ozone-Alerte changeront le 1er janvier 1998 (voir, ci-contre, la rubrique *Qui doit obtenir la carte Ozone-Alerte?*).
- Tout appareil de réfrigération ayant subi une vérification d'étanchéité ou ayant été vidé de ses gaz frigorigènes doit être étiqueté par une personne autorisée, et cette personne doit notifier le propriétaire ou l'utilisateur de l'appareil. La personne autorisée ou son employeur doit garder une copie de l'avis pendant au moins trois ans. L'étiquette doit porter le nom du technicien, le numéro de sa carte Ozone-Alerte, la date d'expiration de la carte, la date à laquelle a eu lieu la vérification et le résultat de celle-ci. Si l'appareil présente une fuite, il faut mentionner sur l'étiquette qu'il est interdit d'y introduire un frigorigène tant qu'il n'aura pas été réparé. Il est interdit d'enlever une étiquette, sauf si elle est remplacée par une nouvelle étiquette.
- Seuls peuvent être rechargés les appareils qui ont été attestés « sans fuite » au cours des six derniers mois et qui ne semblent pas être endommagés, sauf en ce qui concerne les deux exceptions suivantes :
  a) les établissements de santé, lorsque le respect de cette condition poserait un danger imminent à la santé ou à la vie humaine; b) les fermes d'élevage, les fermes agricoles et les installations d'emballage, de traitement ou d'entreposage de denrées périssables, lorsque le respect de cette condition poserait un danger imminent à la vie d'animaux ou des risques imminents d'avarie à des denrées périssables, y compris des produits agricoles et des végétaux. Si un appareil est rechargé en vertu de l'une ou l'autre des exceptions susmentionnées, il faut le signaler sans tarder au ministère de l'Environnement et de l'Énergie. Il faut aussi vérifier si l'appareil fuit et, le cas échéant, le réparer et en informer le Ministère dans les sept jours qui suivent.

Qui doit obtenir la carte Ozone-Alerte?

- Les personnes qui effectuent la réparation ou la recharge d'appareils de réfrigération ont jusqu'au *1er octobre 1994* pour obtenir la carte Ozone-Alerte attestant qu'elles ont réussi un cours de formation les habilitant à manipuler des frigorigènes.
- La carte Ozone-Alerte sera valide jusqu'au 31 décembre 1997. Il sera possible de la renouveler avant cette date en suivant de nouveau un cours de formation approuvé par le ministère de l'Environnement et de l'Énergie.
- Au cours des trois prochaines années, la formation des mécaniciens de véhicules automobiles et des techniciens en réfrigération comprendra un cours sur la manipulation des frigorigènes. À compter du 1er janvier 1998, les personnes qui obtiennent en Ontario un brevet d'aptitude professionnelle relativement à l'un de ces métiers seront habilitées à manipuler des frigorigènes et à effectuer l'entretien d'appareils de réfrigération. Ces personnes n'auront pas à obtenir la carte Ozone-Alerte.

La vente de frigorigènes fluorocarbonés

En vigueur à compter du 1er juillet 1994

- Les vendeurs doivent imposer une consigne d'au moins 25 $ sur toutes les bouteilles pleines qu'ils vendent. Ils doivent aussi s'engager à reprendre chacune des bouteilles de frigorigène qu'ils ont vendues et rembourser la consigne à l'acheteur.

En vigueur à compter du 1er octobre 1994

- Les frigorigènes fluorocarbonés doivent être vendus uniquement à des grossistes ou à des personnes titulaires d'une carte Ozone-Alerte ou à leur employeur. Les frigorigènes doivent en outre être vendus dans des bouteilles réutilisables ou recyclables.

Ministère de l'Environnement et de l'Énergie

Le point sur...

MARS 1994

Le règlement sur l'emploi des frigorigènes fluorocarbonés

APPAUVRISSEMENT DE LA COUCHE D'OZONE

La couche d'ozone stratosphérique parvient généralement à absorber les rayons ultraviolets du Soleil avant que leurs effets destructeurs ne soient ressentis sur la Terre. Au cours des vingt dernières années, ce « bouclier protecteur » qu'est la couche d'ozone s'est appauvri d'environ cinq à dix pour cent. Des substances synthétiques, notamment les fluorocarbures, en sont la cause. Ces substances dites « destructrices d'ozone », dont les plus connues sont les chlorofluorocarbures, ou CFC, sont libérées dans l'atmosphère lorsque des appareils de réfrigération ou de climatisation sont réparés ou mis au rebut.

Le nouveau règlement sur l'emploi des frigorigènes chlorofluorocarbonés entre en vigueur le 29 mars 1994. Le règlement comprend des dispositions quant à l'accréditation des techniciens en réfrigération.

NOUVEAU RÈGLEMENT EN VIGUEUR LE 29 MARS 1994

Le règlement s'étend aux appareils de réfrigération contenant des chlorofluorocarbures (CFC), des hydrochlorofluorocarbures (HCFC) ou des hydrofluorocarbures (HFC).

Sont désignés sous la rubrique « appareils de réfrigération », en autres, les appareils de climatisation mobiles ou fixes, les thermopompes, les réfrigérateurs et les congélateurs.

Qui est visé?

Le règlement vise :

- quiconque fait la réparation et la recharge d'appareils de réfrigération, par exemple les techniciens des secteurs de l'automobile ainsi que les réparateurs d'appareils ménagers et d'appareils de chauffage, de ventilation et de climatisation;
- quiconque vend des frigorigènes fluorocarbonés, par exemple les fabricants de frigorigènes et les grossistes qui fournissent les frigorigènes aux constructeurs automobiles, aux fabricants d'appareils ménagers et aux entreprises de services;
- quiconque récupère les vieux appareils de réfrigération en vue de les éliminer ou de les recycler, par exemple les services municipaux de gestion des déchets ou de travaux publics, les entreprises de récupération et les détaillants qui débarrassent leurs clients des vieux réfrigérateurs et climatiseurs;
- quiconque possède des appareils de réfrigération, par exemple les propriétaires de maisons, de véhicules, d'édifices et d'entreprises.

L'emploi de fluides frigorigènes et l'entretien d'appareils de réfrigération

En vigueur à compter du 29 mars 1994

Il est interdit de libérer des gaz frigorigènes dans l'atmosphère. Cette interdiction vaut également pour la plupart des essais faits pour vérifier le fonctionnement des appareils de réfrigération. Les seules autres solutions légales seront ou bien de recycler les frigorigènes, ou bien de les récupérer.

Ontario

FOR YOUR information

AUGUST 1994

Clean water regulations for the industrial minerals and metal casting sectors

The Ontario Ministry of Environment and Energy has implemented two regulations to protect the environment from pollutants discharged directly to water courses from the industrial minerals and metal casting sectors.

As a result of these regulations, pollutant discharges from both sectors will be substantially reduced. Because of reduced quantities of pollutants, aquatic life should suffer less reproductive abnormalities and other deformities.

The regulations will generate reductions in total suspended solids, zinc and less toxicity in effluent which in turn will limit the degradation of river and lake bottom sediments. This will make water more hospitable to fish and other aquatic life and increase their chances of survival and healthy reproduction.

Implementing the regulations will help Ontario reach the goals of the Remedial Action Plan program in areas which include the Bay of Quinte, the Detroit River and Metro Toronto. Other benefits include reduced discharges from industrial minerals and metal casting plants into Lake Ontario, the Thames River and the Speed River.

The regulations are part of Ontario's commitment to help achieve the objectives of the Canada-United States Great Lakes Water Quality Agreement.

GOAL OF MISA

Clean water regulations are being developed under the Municipal/Industrial Strategy for Abatement (MISA) program.

The goal of MISA is the virtual elimination of persistent toxic substances from effluents discharged into Ontario's waterways. MISA was introduced in 1986 to identify and reduce the pollutants discharged from industrial and municipal sources into Ontario's rivers and lakes.

The first phase of the program -- monitoring the effluent from 300 major industrial direct dischargers -- was completed in August 1991. In September 1991, the ministry published the Issue Resolution Final Report which defined concepts that were crucial for the development and implementation of the clean water regulations. At the same time, the ministry introduced a new direction for the MISA program which included:

- the identification of pollution prevention as the preferred approach to achieving the virtual elimination of persistent toxic substances
- the establishment of effluent limits for a list of sector-specific parameter
- the establishment of a ban or phase-out list for specific persistent toxic substances
- the requirement that final effluent cannot kill fish or water fleas as measured by standardized tests

The ministry has now embarked upon the second phase -- the effluent limits regulation of industrial sector dischargers -- to reduce the amount of conventional and toxic contaminants being discharged.

To date, clean water regulations have been issued for the pulp and paper, petroleum refining, metal mining, industrial minerals and metal casting sectors. Draft regulations have been released for the inorganic and organic chemicals sectors.

PROFILE OF THE INDUSTRIAL MINERALS SECTOR

The industrial minerals sector is made up of companies that mine and process non-metallic minerals and structural materials. Plants in this sector produce a variety of materials including portland cement, lime, gypsum products, graphite, talc, roofing granules, magnesium, nepheline syenite and calcite.

At the beginning of the monitoring phase of MISA, 116 plants were considered for regulation under this sector. Five plants have been excluded from regulation because they do not discharge any effluent. In addition, 85 pits and quarries which were included in the original list, will not fall under this regulation. The results of monitoring indicated that pits and quarries do not discharge any priority pollutants and that their effluent do not kill fish or water fleas. The ministry is examining alternative ways of controlling the operations of these plants.

INDUSTRIAL MINERALS SUB-SECTORS

The 26 plants to be regulated in the industrial minerals sector are divided into the following sub-sectors:

Cement sub-sector

PLANT	LOCATION	RECEIVING WATER
St. Lawrence Cement Corp.	Mississauga	Lake Ontario
Lafarge Canada Inc.	Bath	Lake Ontario
Lafarge Canada Inc.	Woodstock	Thames River
Essroc Canada Inc.	Picton	Lake Ontario
St. Mary's Cement Corp.	Bowmanville	Lake Ontario
St. Mary's Cement Corp.	St. Mary's	Thames River

Chemical lime/magnesium sub-sector

PLANT	LOCATION	RECEIVING WATER
Global Stone	Ingersoll	Thames River
Beachvilime Ltd. (Guelph Dolime Ltd.)	Guelph	Speed River
Beachvilime Ltd. (East Plant)	Beachville	Thames River
Redland Quarries Inc.	Dundas	Hamilton
Beachvilime Ltd. (West Plant)	Beachville	Thames River
Timminco Ltd.	Haley	McLaren's Creek

Graphite/gypsum/nepheline/syenite/basalt/talc/ quartzite sub-sector

PLANT	LOCATION	RECEIVING WATER
Applied Carbon Technology Inc.	Kearney	Georgian Bay
Westroc Industries Ltd.	Drumbo	Grand River
CGC Inc.	Hagersville	Grand River
Domtar Inc.	Caledonia	Grand River
Unimin Canada Inc.	Nephton	Stoney Lake
Unimin Canada Ltd.	Blue Mountain	Kashabog Lake

PLANT	LOCATION	RECEIVING WATER
3 M Canada	Havelock	Plato Creek Georgian Bay
Canada Talc Ltd.	Madoc	Moira Lake
Luzenac Inc.	Timmins	Mattagami River
Unimin Canada Ltd.	Badgeley Island	North Channel

Salt sub-sector

PLANT	LOCATION	RECEIVING WATER
Sifto Canada Inc. Goderich Mine	Goderich	Lake Huron
Sifto Canada Inc. Evaporator Plant	Goderich	Lake Huron
The Canadian Salt Company Ltd. Ojibway mine	Windsor	Detroit River
The Canadian Salt Company Ltd. Evaporator Plant	Windsor	Detroit River

ESTABLISHING THE DISCHARGE LIMITS

The clean water regulation for the industrial minerals sector establishes legal limits for pollutants discharged by the 26 plants. The effluent limits are based on the results of a 12-month monitoring program and an evaluation of the best available technology (BAT) for the sector.

The ministry defines BAT as a combination of demonstrated treatment technologies and in-plant controls. To determine BAT, a consultant was hired to conduct a world-wide search for modern wastewater treatment practices.

In anticipation of the MISA regulations, some Ontario companies have already installed best available technologies.

Under the regulation, the affected companies are free to choose how they intend to meet the limits. For example, rather than installing pollution prevention controls. A description of the available technology is contained in the report The Best Available Pollution Control Technology Industrial Minerals Sector.

The regulation consists of limits on suspended solids and pH (a measure of acidity and alkalinity). The effluents must be non-toxic to fish and water fleas (Daphnia magna). Total suspended solids must be limited to a monthly average of 25 milligrams per litre. The limits are stated in terms of concentration.

OTHER JURISDICTIONS

Ontario's effluent limits for total suspended solids for the industrial minerals sector is comparable to those of other jurisdictions, as indicated in the table below. Limits in Ontario, however, are mandatory as opposed to most jurisdictions which have guidelines.

JURISDICTION	TSS GUIDELINES (milligrams per litre)
Ontario	25
Quebec	25
New Brunswick	25
Nova Scotia	25
Newfoundland	30 (above background)
Saskatchewan	25 - 50
Alberta	35
British Columbia	25 - 75
United States	30 (Gypsum)
France	30
Germany	100
United Kingdom	250

PROFILE OF THE METAL CASTING SECTOR

The metal casting sector consists of foundries and die casters. Metal castings are produced by cooling molten metal into desired shapes (for example, engine parts, industrial equipment, aircraft parts).

In Ontario, in 1992, there were approximately 160 active metal casting plants which employed 5,000 people.

Currently, of the 160 metal casting companies only seven discharge directly into waterways. Two of the seven will be regulated: Haley Industries, located near Pembroke which manufactures aluminum and magnesium castings for the aerospace industry and the Windsor Casting Plant of Ford, which manufactures iron castings for the automotive industry.

One plant, General Motors, St. Catharines announced that it will close in 1994. The remaining four plants discharge cooling water which, because it does not mix with process wastewater, should not be contaminated. These four plants will be subject to toxicity limits and required to monitor their cooling water on a regular basis.

The Richmond Die Casting Ltd. plant which was listed in the draft regulation released for public consultation in October 1993, has since changed its location and is no longer a direct discharger.

The four metal casting plants which will be required to monitor their cooling water on a weekly basis are:

Canada Alloy Castings Ltd, Kitchener
Chrysler Canada Ltd., Etobicoke
Kubota Metal Corp., Orillia
Western Foundry Co. Ltd., Wingham

The effluent from the four plants must not kill fish and water fleas. Each of the four plants will monitor for DOC and TSS, with the Chrysler and Western Foundry plants also monitoring for phenolics and fluroide.

Should any of these four companies find significant levels of contaminants in their cooling water, the ministry will require the plants to investigate the source(s) and reasons for the contamination and to take remedial measures.

ESTABLISHING THE DISCHARGE LIMITS

Limits for the two plants in the sector are based on the results of a 12-month monitoring program and an evaluation of the best available technology (BAT) for the sector.

The ministry defines BAT as a combination of demonstrated treatment technologies, process changes and in-plant controls. To determine BAT, a consultant was hired to conduct a world-wide search of applicable treatment practices.

Regulated companies are free to choose how they intend to meet the limits. For example, rather than installing end-of-pipe treatment, companies may choose to implement pollution prevention controls. A description of available technology is contained in the report "Best Available Technology for Effluent Treatment in the Metal Casting Sector".

The clean water regulation for the metal casting sector will require Ford and Haley Industries to reduce the amounts of a number of specific pollutants being discharged to the Detroit River and McLaren Creek, (a tributary of the Ottawa River) respectively. It will also require that all effluents do not kill fish or water fleas and that the pH of all effluents is in the range 6.0 - 9.5.

Reducing the amounts of pollutants being discharged to the Detroit River from the Ford plant will help meet the objectives of the Detroit River Remedial Action Plan.

POLLUTANTS BEING REGULATED

FORD	HALEY
Dissolved Organic Carbon (DOC)	Biochemical Oxygen Demand (BOD)
Total Suspended Solids (TSS)	TSS
Aluminum	Aluminum
Zinc	Zinc
Phenolics	Phenolics
Total Cyanide	Total Cyanide Chromium Copper Silver Ammonia/ Ammonium

OTHER JURISDICTIONS

The limits in the regulation are comparable to or surpass limits in force in Germany, Japan and Taiwan.

HOW THE REGULATIONS WERE DEVELOPED

The regulations for the industrial minerals and metal casting sectors were developed through the participation of industry and Environment Canada in joint technical committees. A representative of the MISA Advisory Committee, a body of independent scientific and environmental experts appointed by the minister, attended the joint technical committee meetings as an observer.

A 60-day public consultation period was held in October, 1993.

PENALTIES FOR VIOLATIONS

Corporations not complying with the clean water regulations are subject to a maximum fine of $50,000 per day for a first conviction and $100,000 per day for subsequent convictions.

WHERE TO GET MORE INFORMATION

To receive more information on the clean water regulations for the industrial minerals and metal casting sector, please call the Ontario Ministry of Environment and Energy at 1-800-565-4923.

Ministry of Environment and Energy

FOR YOUR information

SEPTEMBER 1994

Ontario's Drinking Water Surveillance Program

The goal of Ontario's water treatment facilities is to provide the people of this province with high quality drinking water.

One of the ways the Ministry of the Environment is working to achieve the goal is through its unique computerized information system; the Drinking Water Surveillance Program - or DWSP.

The program monitors and evaluates the quality of Ontario's drinking water at select locations. DWSP provides detailed and ongoing documentation on the progress and performance of municipal water treatment plans across the province.

The program was introduced in 1986, and by 1993 had expended its monitoring operations to 122 locations DWSP currently monitors the drinking water of more than 70 per cent of Ontario's population, and is expected to include all municipal drinking water supplies in the province within the next few years.

While the main purpose and value of DWSP is to build a database which contributes to the goal of safe drinking water on a long term basis, the data compiled also enables DWSP staff to respond quickly to emergency situations.

PRIME OBJECTIVES

- To obtain and maintain immediate, reliable and current information on the quality of drinking water across Ontario.
- To establish an alert system that tags problems and notifies authorities when the level of a contaminant of any water treatment plant being monitored exceeds Ontario Drinking Water objectives.
- To define contaminant levels and trends and maintain this data for immediate reference.
- To provide comprehensive background information which would be readily available if remedial action is called for.
- To create a framework for assessing new contaminants.
- To monitor the efficiency of water treatment processes at various plants.

HOW DWSP WORKS

The program involves five stages;

1. Plant processes, facilities and capacities are assessed.
2. Regular samples of raw and treated water are taken at the plant, and form at least one consumer's tap in the distribution system.
3. Water samples are analyzed for up to 180 substances.
4. A database is created and maintained, allowing quick province wide access to detailed information by ministry staff.
5. Monthly and annual reports are prepared.

ASSESSING THE PLANTS

Under DWSP, treatment plants are assessed prior to water sampling to provide background information. The process involves close co-operation between plant operators, regional authorities and the ministry.

A DWSP questionnaire is used to obtain information on the treatment plant and the water distribution system associated with it. Information gathered includes plant size and capacity, population served, physical and chemical processes used, reservoir facilities and plant sampling locations, samples collected from consumer systems are assessed for water supply source, for rate of water flow and for the presence of any materials which might come into contact with the water supplied.

Information gathered on water distribution systems includes the type and quality of watermains, reservoirs and tanks used, as well as their service connections to households served. Also documented are the municipalities served and sample site descriptions and locations. As well, plumbing details for the homes selected as sample sites are obtained, including materials used, length of household plumbing and service connections. Information is verified through site visits and updates of the questionnaires.

TAKING SAMPLES

Accurate and reliable sampling procedures ensure the reliability of DWSP data and reports. All sampling procedures are standardized so that samples taken from different plants can be compared and corrected.

Personnel at water treatment plants are trained in all aspects of the sampling procedure by DWSP technical assessment specialists and a sampling schedule is established.

At each plant, raw water is sampled prior to treatment. Next, water is sampled after it has gone through all the treatment processes.

To check the distribution system, samples are collected from one older home near the plant and one home in a newer section of the municipality. This helps to determine whether water quality is affected by the time it is retained in the distribution system. This procedure also checks the effect of older versus newer materials used in the construction of watermains.

ANALYZING RESULTS

A major objective of DWSP is to produce and maintain a comprehensive, reliable database. To achieve this, standardized and documented analytical methods are used.

Ministry laboratories are equipped to perform a large number of chemical and microbiological analyses on the samples collected, using standardized analytical methods. Strict analytical and quality control measures are undertaken to ensure consistent analysis and to produce reliable, accurate and comparable results.

MEASURING PARAMETERS

A Parameter Reference File has been developed to provide a computerized list of every compound or substance measured by DWSP. Samples routinely are measured for about 280 parameters. These parameters include health-related aesthetic and process categories, and are based on Ontario drinking water objectives.

Results of sampling are routinely compared with the Parameter Reference File. When a compound is detected in a water sample the file supplies sufficient preliminary background information for further investigation.

If sampling reveals contaminants at levels which exceed health-related guidelines, additional samples are taken, and regional staff are notified. They initiate the appropriate remedial action.

ANNUAL REPORTS

Reports are prepared each year and sent to participating municipalities. The reports summarize laboratory and field data, water quality trends, treatment efficiency and distribution data. These reports are also available to the general public on request.

INFORMATION AND EVALUATION

Initial input to the DWSP computer system is based on information obtained by assessing plant and distribution systems through questionnaires, plant visits and annual updates. Test results and field data are added to the DWSP database as results become available via computer linkages to the ministry's laboratory. It is the intension of DWSP to give municipalities regions and other ministry staff access to this information through direct computer links.

DWSP personnel can extract data and generate general interest, scientific and technical applications reports in response to inquiries from ministry personnel, consultants, the media and the general public. Comparisons can be made on the performance of a single plant over a period of time, or on the results of sampling at several plants.

FOR MORE INFORMATION, PLEASE CONTACT:

Ministry of Environment and Energy
Environmental Monitoring and Reporting Branch
Drinking Water Section
125 Resources Road, West Wing
Etobicoke, Ontario
M9P 3V6
Tel: (416) 235-6300

RAPPORTS ANNUELS

Des rapports sont préparés chaque année et envoyés aux municipalités participantes. Ces rapports résument les données de laboratoire et de terrain, les tendances relatives à la qualité de l'eau et les données sur l'efficacité des procédés de traitement et sur le réseau de distribution. Le public peut consulter ces rapports sur demande.

INFORMATION ET ÉVALUATION

Les données initiales entrées dans le système informatique proviennent des réponses aux questionnaires d'évaluation des usines et des réseaux de distribution ainsi que des visites sur les lieux et des mises à jour annuelles. Les données analytiques et les données recueillies sur le terrain sont versées directement dans la base de données par les laboratoires du Ministère, qui sont reliés au réseau informatique. Le personnel du Ministère et des municipalités aura aussi en temps opportun un accès informatique direct aux résultats des analyses mensuelles.

Ainsi, l'équipe du Programme de surveillance peut extraire des données du système et produire sur demande des rapports d'intérêt général, scientifique ou technique à l'intention du personnel du Ministère, des consultants, des médias ou du grand public. Elle peut aussi comparer les résultats de l'échantillonnage d'une usine en particulier sur une période de temps donnée ou comparer les résultats de l'échantillonnage de plusieurs usines à un moment donné.

Pour obtenir de plus amples renseignements, veuillez vous adresser au :

Ministère de l'Environment et de l'Énergie
Direction de la surveillance environnementale
Section de l'eau potable
125, chemin Resources, aile ouest
Etobicoke ON M9P 3V6
Tél. : (416) 235-6300

ÉVALUATION DES USINES

Dans le cadre du Programme de surveillance de l'eau potable, on évalue les usines de traitement avant le prélèvement d'échantillons afin d'obtenir tous les renseignements généraux nécessaires. L'évaluation exige une collaboration étroite entre les opérateurs ou opératrices de l'usine, les autorités régionales et le personnel du Ministère.

Un questionnaire permet de recueillir des renseignements sur l'usine de traitement et son réseau de distribution. Les questions portent sur la taille et la capacité de l'usine, la population desservie, les procédés physiques et chimiques utilisés, les réservoirs et les points de prélèvement. Les analyses effectuées chez les consommateurs permettent d'établir la source d'eau potable, le débit et la présence de toute matière pouvant entrer en contact avec l'eau d'alimentation.

Les questions qui ont trait au réseau de distribution portent sur le type et le nombre de conduites maîtresses, de réservoirs et de bassins, ainsi que sur les tuyaux de branchement aux résidences. Les municipalités desservies, la description et l'emplacement des points de prélèvement font partie des renseignements généraux demandés. Les questionnaires servent de plus à obtenir des informations précises sur la tuyauterie des résidences choisies comme point de prélèvement, notamment les matériaux utilisés et la longueur de la tuyauterie et des tuyaux de branchement. Les renseignements recueillis sont vérifiés lors de visites sur les lieux et de la mise à jour des questionnaires.

PRÉLÈVEMENT D'ÉCHANTILLONS

La fiabilité des données et des rapports du Programme de surveillance de l'eau potable repose sur l'uniformité et la précision des procédés d'échantillonnage employés. Tous les procédés sont normalisés afin que les échantillons prélevés puissent être comparés en fonction des mêmes paramètres.

Le personnel des usines de traitement de l'eau affecté au prélèvement d'échantillons est formé par des spécialistes en évaluation technique du Programme de surveillance de l'eau potable. On leur fournit également un calendrier d'échantillonnage.

Un échantillon d'eau brute non traitée est prélevé dans chaque usine. L'eau est ensuite analysée après traitement.

Pour évaluer le réseau de distribution, on prélève des échantillons dans une résidence plus ancienne située près de l'usine de traitement et dans une autre résidence dans un secteur plus récent de la municipalité. Cet échantillonnage permet de déterminer si la qualité de l'eau varie selon la durée de son séjour dans le réseau de distribution. Il permet aussi de déterminer l'effet sur la qualité de l'eau des matières entrant dans la composition des nouvelles conduites maîtresses et des conduites plus anciennes.

ANALYSE DES RÉSULTATS

Comme il a été mentionné plus haut, un des principaux objectifs du programme est de constituer et de tenir une base de données complète et fiable. C'est pourquoi on a recours à des méthodes analytiques normalisées et éprouvées.

Les laboratoires du Ministère sont dotés d'un équipement permettant d'effectuer une vaste gamme d'analyses chimiques et microbiologiques normalisées. Afin d'obtenir des résultats fiables, précis et comparables, on emploie des méthodes analytiques qui font l'objet d'un contrôle de la qualité rigoureux.

MESURE DES PARAMÈTRES

Un fichier de référence informatisé a été dressé pour le catalogage des composés et substances évalués dans le cadre du Programme de surveillance de l'eau potable. Environ 180 paramètres sont mesurés dans le cadre de l'analyse routinière des échantillons prélevés. Ces paramètres, d'ordre sanitaire, esthétique et industriel, sont fondés sur les objectifs de qualité de l'eau potable de l'Ontario.

Les résultats des analyses sont automatiquement comparés au fichier de référence informatisé. Lorsqu'on décèle la présence d'un composé dans l'échantillon d'eau, on consulte le fichier pour obtenir les renseignements généraux nécessaires pour pousser plus avant l'analyse.

Si les échantillons prélevés contiennent des contaminants à une concentration supérieure aux normes de santé, il faut prélever d'autres échantillons et notifier les agents du bureau régional du Ministère. Ces derniers prendront ensuite les mesures correctrices qui s'imposent.

Ministère de l'Environnement et de l'Énergie

Le point sur...

AUTOMNE 1994

Le Programme de surveillance de l'eau potable en Ontario

Les installations de traitement de l'eau de la province ont comme objectif de fournir à la population ontarienne de l'eau potable de première qualité.

Pour relever ce défi, le ministère de l'Environnement et de l'Énergie a mis au point un système d'information informatisé unique : le Programme de surveillance de l'eau potable.

Ce programme a pour but de surveiller, d'évaluer et de préserver la qualité de l'eau potable en Ontario. Il constitue un dossier détaillé et suivi des progrès et de l'efficacité des usines municipales de traitement de l'eau de la province.

Le Programme de surveillance de l'eau potable a été lancé en 1986 et était en place dans 122 localités dès 1993. À l'heure actuelle, le programme assure la surveillance de l'eau potable de plus de 70 p. 100 de la population ontarienne, et on prévoit qu'il englobera toutes les sources municipales d'eau potable de la province d'ici quelques années.

Un des principaux objectifs du programme est de constituer une base de données qui permettra de préserver à long terme la qualité de l'eau potable en Ontario. Les données recueillies permettent aussi au personnel affecté au programme de réagir rapidement aux situations d'urgence qui peuvent survenir.

OBJECTIFS PRINCIPAUX

- Constituer une banque de données fiables, rapidement accessibles et à jour sur la qualité de l'eau potable dans l'ensemble de la province.
- Établir un système d'alerte signalant aux autorités compétentes les cas où les concentrations de contaminants dans l'eau potable d'une usine de traitement de l'eau qui fait l'objet d'une surveillance dépassent les limites provinciales.
- Établir les concentrations de contaminants, déterminer les tendances et consigner ces données de manière à ce qu'elles puissent être consultées sans délai.
- Fournir, aux fins de consultation, les renseignements généraux nécessaires à la mise en oeuvre des mesures correctrices qui s'imposent.
- Élaborer une marche à suivre pour l'évaluation de nouveaux contaminants.
- Surveiller l'efficacité des procédés de traitement de l'eau employés dans diverses usines.

FONCTIONNEMENT DU PROGRAMME

Le programme comprend cinq étapes :

1. L'évaluation des procédés, des installations et de la capacité des usines de traitement.
2. Le prélèvement régulier sur place d'échantillons d'eau brute et d'eau traitée et d'au moins un échantillon d'eau potable au domicile d'un consommateur desservi par le réseau.
3. L'analyse d'échantillons d'eau pour y déceler la présence de jusqu'à 180 substances.
4. La création et la mise à jour d'une banque de données accessible partout dans la province par les responsables du Ministère.
5. La préparation de rapports mensuels et annuels.

Ontario

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PIBS 1890B

Ministry of Environment and Energy

FOR YOUR information

FEBRUARY 1995

Final clean water regulations released for organic chemical manufacturing and inorganic chemical sectors

On Feb. 14, 1995, Ontario released final clean water regulations to protect provincial waterways from pollutants discharged by the organic chemical manufacturing (OCM) and inorganic chemical (IC) sectors.

The clean water regulations establish limits for pollutants discharged by manufacturing plants in the two sectors. They are designed to reduce significantly the amount of toxic and other pollutants entering Ontario's waterways from these plants.

The OCM and IC sectors are two of the largest users of water in Ontario. Water is used mainly for cooling, but significant quantities are also used for process purposes.

Reducing the quantity of toxic chemicals discharged in effluents from the organic and inorganic chemical sectors will reduce the risks posed to the environment, human health, fish and wildlife. The clean water regulation limits also will help the ministry implement initiatives such as the Canada-Ontario Agreement respecting Great Lakes Water Quality, the Remedial Action Plan program and the Lake Ontario Toxics Management program.

The regulations were developed under the Municipal-Industrial Strategy for Abatement (MISA) program.

THE ORGANIC CHEMICAL MANUFACTURING SECTOR AT A GLANCE

Companies in the organic chemical manufacturing sector make a variety of products, including plastics, fibres, synthetic rubber, detergent bases, industrial solvents and gasoline additives.

The OCM sector employs about 9,800 people at 26 plants. The plants are distributed mainly along the Great Lakes Basin:

Area	Number of plants
Sarnia	10
Kingston/Cornwall	7
Toronto/Durham	3
Niagara	2
Cobourg	1
Arnprior	1
Elmira	1
Longford Mills	1

Plants in the OCM sector discharge into the St.Clair River, Niagara River, St.Lawrence River, Ottawa River, Grand River, Lake Ontario and Lake St. John.

Major companies in the sector include Dow Chemical Canada Inc., Dupont Canada Inc., Imperial Oil Chemicals Division, BASF and Polysar Rubber Corporation.

THE INORGANIC CHEMICAL SECTOR AT A GLANCE

Companies in the inorganic chemical sector produce fertilizers, abrasives, carbon black, mineral-based insulating materials, industrial gases, acids and explosives.

The IC sector employs about 3,000 people at 25 plants:

Area	Number of plants
Sarnia	7
Niagara	6
Cornwall/Maitland	5
Port Maitland	2
Sault Ste. Marie	1
North Bay	1
Hamilton	1
Amherstburg	1
Elmira	1

Plants in the inorganic chemical sector discharge into the St.Mary's River, St.Clair River, Detroit River, Niagara River, St. Lawrence River, Grand River, Lake Erie, Lake Ontario and Lake Nipissing.

Major companies in the sector include: ICI Canada, Terra Industries Inc., General Chemical Canada Ltd. and Nutrite Inc.

ESTIMATED COSTS OF IMPLEMENTING THE REGULATIONS

The estimated capital cost of compliance with the limits for the organic chemical manufacturing sector is $51.6 million, with an annual operating cost of $16.1 million.

The estimated capital cost of compliance with the limits for the inorganic chemical sector is $16.9 million, with an annual operating cost of $1.85 million.

GOAL OF CLEAN WATER REGULATIONS

The goal of Ontario's clean water limits regulations is the virtual elimination of persistent toxic substances from effluents discharged into Ontario's waterways. The program was introduced in 1986 to identify and reduce the pollutants discharged from industrial and municipal sources into Ontario's rivers and lakes.

The first phase of the program -- monitoring the effluents from 300 major industrial direct dischargers -- was completed in August 1991. In September 1991, the Ministry of Environment and Energy published the Issue Resolution Final Report which defined concepts crucial to the development and implementation of the clean water limits regulations. At the same time, the ministry introduced a new direction for the program which included:

- the identification of pollution prevention as the preferred approach to achieve the virtual elimination of persistent toxic substances
- the establishment of effluent limits for a list of sector-specific parameters
- the establishment of a ban or phase-out list for specific persistent toxic substances
- the requirement that final effluents cannot kill fish or water fleas as measured by standardized tests

The second phase of the program -- establishing regulations that set effluent limits for industrial sector dischargers -- is nearing completion. Regulations have been finalized for seven of the nine MISA industrial sectors.

REDUCTION OF LOADINGS

The limits in the regulations are expected to reduce discharges of toxic chemicals of concern by almost 50 per cent from the OCM sector and by about 16 per cent from the IC sector.

These chemicals include seven contaminants on the ministry's list of candidate substances for bans, phase-out or reduction: arsenic, mercury, 1,4-dichlorobenzene, phenanthrene, hexachlorobenzene, PCBs (polychlorinated biphenyls) and polychlorinated dioxins and furans.

Estimated reductions of conventional pollutants -- including total suspended solids, phosphorus, nitrogen compounds, and oil and grease -- for the OCM and IC sectors are 43 per cent and 22 per cent respectively.

THE MAJOR ENVIRONMENTAL CONCERNS

Some wastewaters from the organic chemical manufacturing and inorganic chemical sectors contain persistent toxic chemicals such as chlorinated solvents, polychlorinated dibenzodioxins and dibenzofurans, polychlorinated biphenyls (PCBs) and heavy metals such as mercury, nickel, zinc and chromium. The wastewaters also contain conventional pollutants such as suspended solids, phosphorus and nitrogen compounds which could impair the uses of receiving waters.

Persistent toxic chemicals including heavy metals can accumulate in sediments on the bottom of a body of water and can be harmful to human health, fish, aquatic plants and other aquatic life. These chemicals have been linked to cancers and birth defects in humans.

ESTABLISHING THE DISCHARGE LIMITS

The clean water limits in the regulation are based on the results of a 12-month monitoring program and an examination of the best available technology (BAT) for reducing the discharge of contaminants in each sector.

The ministry defines BAT as a combination of demonstrated treatment technologies and industrial process changes that can reduce or eliminate pollution and are affordable to the industry. To determine BAT, the ministry hired consultants to conduct a world-wide search for modern wastewater treatment practices and process technologies applicable to the two sectors.

Regulated plants are free to choose how they meet the limits. For example, rather than installing end-of-pipe treatment, companies may choose to implement pollution prevention measures.

A description of the available technologies for the two sectors are contained in the BAT consultant's report.

The OCM and IC sector clean water regulations will result in the application of legally enforceable limits across the province.

REGULATED REQUIREMENTS

Because of the product and process diversity in the two sectors, each plant has a site-specific set of limits for the parameters of concern at the site.

Sector-wide parameters that are limited at every OCM sector plant are dissolved organic carbon (DOC), phosphorus, total suspended solids, phenolics, and oil and grease.

Similarly, for the IC sector, total suspended solids, DOC and phosphorus are limited at each plant.

All final discharges at all plants must not kill fish or water fleas (as demonstrated by a standard acute lethality test) and must be within a pH-range of 6.0 to 9.5 at all times.

All plants must ensure that their wastewaters meet the following concentration limits for polychlorinated dioxin and furan groups:

- < 20 picograms/L for 2,3,7,8-tetrachlorodibenzo-p-dioxin
- < 50 picograms/L for 2,3,7,8-tetrachlorodibenzofuran
- For 17 other types of 2,3,7,8-substituted dioxins and furans, the total toxic equivalent (TEQ) must be ≤ 60 picograms/L

A listing of the 17 other types of dioxins and furans and the method for calculating their total toxic equivalent concentration are described in the Sampling and Analytical Protocol (Ministry of Environment and Energy, ISBN 0-7778-1880-9, August 1994).

COMPARISON TO OTHER JURISDICTIONS

The limits for the organic chemical manufacturing sector were reviewed against limits or guidelines of other jurisdictions including other Canadian provinces, the United States and Europe. The Ontario limits were found generally to be more stringent.

APPLYING THE DISCHARGE LIMITS

There are two general approaches to reducing the quantities of pollutants in plant effluents: in-plant pollution prevention and end-of-pipe treatment.

In-plant pollution prevention consists of process modifications, chemical substitution and water reduction and recycling. In the organic chemical manufacturing sector, for example, one plant has replaced the harmful chemical benzene which was used as a solvent, with the less harmful chemical cyclohexane.

In-plant recycling of wastewaters is becoming a common practice in industry. Typically, pollutants can be removed from wastewaters by treatment such as filtration and the cleaned-up water can be re-used in the process.

End-of-the-pipe treatment processes commonly used in these two sectors to improve effluent quality include filtration or sedimentation, biological treatment and activated carbon adsorption.

In addition to limits on specific parameters, plants in the OCM and IC sectors are required to monitor cooling waters, conduct chronic toxicity tests on final effluents and carry out storm water control studies.

The regulations also incorporate a number of standard monitoring and reporting requirements (in common with clean water regulations for the other MISA sectors). Sections of the regulations govern: compliance monitoring, the location of sampling points, sampling and analytical procedures, toxicity testing, the calculation of loadings, effluent flow measurement, quality control, record keeping and reporting to the ministry and to the public.

HOW THE REGULATIONS WERE FINALIZED

The regulations were finalized following a 60-day public comment period. Consultations were held with affected plants and trade unions, as well as with First Nations representatives. The draft regulations were also reviewed by the MISA Advisory Committee, which is made up of environmental experts from academia, industry and public interest groups.

PENALTIES FOR VIOLATIONS

Corporations not complying with clean water regulations can be subject to a maximum fine of $50,000 per day for a first conviction and $100,000 per day for subsequent convictions.

WHERE TO GET MORE INFORMATION

Copies of the regulations for the organic chemical manufacturing (PIBS #407-EO2) and inorganic chemical (PIBS #522-EO2) sectors can be obtained by calling the Ministry of Environment and Energy's Public Information Centre at (416) 323-4321 or 1-800-565-4923.

Ministry of Environment and Energy

FOR YOUR information

APRIL 1995

Clean water regulations for the iron and steel manufacturing and electric power generation sectors

On April 13, 1995, clean water regulations became law for the final two of nine industrial sectors targeted under the province's Municipal-Industrial Strategy for Abatement (MISA).

The regulations will protect Ontario's waterways from pollutants discharged by the iron and steel manufacturing and electric power generation sectors.

The clean water regulations establish legally enforceable limits for pollutants discharged by plants in the two sectors. They are designed to reduce significantly the amount of toxic and other pollutants entering Ontario's waterways from the sector plants.

Reducing the quantity of toxic chemicals discharged in effluents from the iron and steel and electric power generation sectors will reduce the risks posed to the environment, human health, fish and wildlife.

The clean water regulation limits also will help Ontario meet its commitments under such initiatives as: the Canada-Ontario Agreement on the Great Lakes; Remedial Action Plans for Hamilton Harbour, the St. Marys and St. Clair rivers; the Lake Ontario Lakewide Area Management program; and the Binational Program to Restore and Protect Lake Superior.

THE IRON AND STEEL MANUFACTURING SECTOR AT A GLANCE

Iron and steel making involve the conversion of coal into coke, which is then combined with iron ore and limestone in a blast furnace to produce molten iron. The iron is then converted into steel in either basic oxygen furnaces or electric arc furnaces. Following these steelmaking operations, the steel is subjected to a variety of finishing operations to yield products of various shapes and sizes with desired mechanical and surface characteristics.

Seven plants in the Ontario iron and steel sector discharge effluents directly to surface waters and are regulated under the clean water regulations. These seven plants include four integrated mills (where coke and iron ore are used), two mini-mills and one specialty steelmill. They jointly account for about 74 per cent of Canadian steel production.

Products manufactured by the plants are heavy structural and seamless tubular steel products, steel rails, hot and cold rolled sheets, flat rolled galvanized plates and stainless bars and rods.

The iron and steel sector plants are located along the St. Marys, Welland and Ottawa rivers, as well as Lake Ontario and Hamilton Harbour. They discharge approximately 1.1 million m^3/day of process effluent and 1.3 million m^3/day of cooling water into Ontario waterways. Algoma Steel Inc. (Sault Ste. Marie), Stelco Hilton Works (Hamilton) and Dofasco Steel (Hamilton) account for more than 70 per cent of the sector's effluent.

Ontario

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PIBS 3328-01

THE ELECTRIC POWER GENERATION SECTOR AT A GLANCE

The Electric Power Generation Sector Effluent Limits Regulation applies only to facilities operated by Ontario Hydro's fossil and nuclear business units. Hydroelectric facilities are not regulated under this sector because they do not discharge process effluents and there are no significant levels of contaminants found in other effluents they release.

There are five operating coal fired stations and one oil fired station under the fossil business unit. Two shut-down plants are also maintained by the fossil business unit.

There are four uranium oxide-fuelled nuclear power stations and three associated facilities under the nuclear business unit.

The fossil and nuclear power generating stations employ an estimated 12,000 people at the various station locations.

The Ontario Hydro power generating facilities produced 132.4 terrawatt hours (TW.h) of electricity in 1993. Of this total, 59 per cent was generated at nuclear stations and 14 per cent was generated at fossil stations. All stations except the Atikokan station are located on the shores of the Great Lakes and their interconnecting channels.

Electric power generation plants discharge approximately 200,000 million m^3/day of process effluent and 700,000 million m^3/day of cooling water into Ontario waterways. The six operating fossil generating stations account for more than 70 per cent of the sector's effluent.

CLEAN WATER REGULATION GOALS

The goal of Ontario's clean water regulations is the virtual elimination of persistent toxic substances from effluents discharged into Ontario waterways.

REDUCTION OF LOADINGS

The limits in the iron and steel manufacturing regulation are expected to decrease the total discharges of conventional, non-conventional and toxic pollutants discharged by the sector plants by approximately 3,600 tonnes per year. The expected annual loading reductions include 54 per cent for conventional contaminants and 81 per cent for non-conventional and persistent toxic compounds.

The limits in the electric power generation sector regulation will decrease the total loadings of conventional and toxic pollutants discharged by plants in the sector by approximately 770 tonnes per year. Conventional contaminants, such as total suspended solids, will be reduced by about 70 per cent while non-conventional and toxic contaminants will be reduced by about 26 per cent.

WHAT ARE THE MAJOR ENVIRONMENTAL CONCERNS

Some wastewaters from the iron and steel manufacturing and electric power generation sectors contain conventional pollutants such as suspended solids, oil and grease and metals such as aluminum, copper, nickel, zinc and chromium.

Cokemaking operations in integrated steel plants produce toxic chemicals such as ammonia and cyanide, and toxic organic compounds, such as volatiles (benzene, styrene), and polynuclear aromatic hydrocarbons (e.g. benzo(a)pyrene).

International Joint Commission and MOEE studies have identified areas of environmental concern related to discharges to the St. Marys River at Sault Ste. Marie and Hamilton Harbour at Hamilton. In the St. Marys River, significant levels of polynuclear aromatic hydrocarbon compounds (PAHs), heavy metals, ammonia, cyanide and phenolics are found in the river water and sediments. PAHs, many of which persist in the environment and are toxic to aquatic life, were also found in fish and test clams.

Similar problems exist in Hamilton Harbour where PAHs and heavy metals are found in sediment and aquatic life.

Toxic chemicals can be harmful to human health, fish, aquatic plants and other aquatic life. These chemicals have been linked to cancers and birth defects in humans.

ESTABLISHING THE DISCHARGE LIMITS

The limits in clean water regulation are based on the results of a 12-month regulatory monitoring program and an examination of the best available technology (BAT) for reducing the discharge of contaminants in each sector.

The ministry defines BAT as a combination of demonstrated treatment technologies and industrial process changes that can reduce or eliminate pollution and are affordable to the industry. To determine BAT, the ministry hired consultants to conduct a world-wide search for modern wastewater treatment practices applicable to the two sectors.

The regulated plants are free to choose how they will meet the limits. For example, rather than installing end-of-the-pipe treatment, companies may choose to implement pollution prevention measures.

A description of the available technologies for the two sectors are contained in the BAT consultants' reports.

REGULATED REQUIREMENTS

The major features of the regulations are:

a) maximum daily and monthly-average discharge limits for 12 parameters at iron and steel plants, ranging from four for Lasco (Whitby) to 11 for the Stelco Hilton Works;

b) maximum daily and monthly-average concentration limits for nine parameters at electric power generation stations, ranging from one at the Bruce Heavy Water Plant to five at nuclear stations;

c) requirements that process and cooling water effluents must not kill fish or water fleas;

d) requirements that process effluents fall within a pH range of 6.0 to 9.5 at all times;

e) monitoring of all process effluents for chronic toxicity;

f) monitoring of cooling water;

g) prohibition of bypasses;

h) standard record keeping and reporting requirements.

COMPARISON TO OTHER JURISDICTIONS

The limits for the iron and steel manufacturing and electric power generation sectors have been reviewed against limits or guidelines of other jurisdictions, including Canadian provinces, the United States and Europe. The Ontario limits were found generally to be equivalent or more stringent.

APPLYING THE DISCHARGE LIMITS

There are two general approaches to reducing the quantities of pollutants in plant effluents: in-plant pollution prevention and end-of-pipe treatment.

In-plant recycling of wastewaters is becoming a common practice in industry. Typically, pollutants can be removed from wastewaters by treatment such as filtration and the cleaned-up water can be reused in the process.

End-of-pipe treatment processes commonly used in these two sectors to improve effluent quality include filtration, clarification or sedimentation, steam stripping and biological treatment.

SECTORS INITIATIVES

The iron and steel manufacturing and electric power generation sectors have already undertaken several initiatives to make it easier to comply with the regulation:

<u>A - Iron and Steel Manufacturing Sector:</u>

* Stelco Inc, in a joint venture with Japan's Mitsubishi Corp., is installing a pulverized coal injection facility at its Hilton Works in Hamilton. This will result in reductions of toxic organic chemicals to the air and water, and reductions in energy costs. This coal injection facility will be operational by the end of 1995.

* Dofasco is installing an electric arc furnace and slab casting facilities the company's Hamilton location. The new furnace technology will not result in additional liquid effluent. It will be in operation by the Fall of 1996.

* The introduction of water recycling systems for several processes at Algoma Steel, Dofasco Inc. and Ivaco will result in significant conservation of water, together with reduced emissions of conventional and non-conventional pollutants.

<u>B - Electric Power Generation Sector:</u>

* A reduction by almost 50 per cent of wastewater flow from the ash lagoon at the Nanticoke station was accomplished by the installation of a $170-million dry fly ash system.

* Bruce A and B stations are currently upgrading their wastewater treatment systems.

HOW THE REGULATIONS WERE DEVELOPED

The two new clean water regulations were developed with the participation of the Canadian Steel Environmental Association, Ontario Hydro and the federal government in two sectoral joint technical committees. A representative of the MISA Advisory Committee of Independent Environmental Experts also attended the joint technical committee meetings.

Meetings were also held with representatives of the United Steel Workers of America, and the Power Workers Union and the First Nations.

A 60-day comment period was provided for public comment on the regulations.

PENALTIES FOR VIOLATIONS

Corporations that fail to meet the requirements of clean water regulations may be subject to a maximum fine of $50,000 per day for a first conviction and $100,000 per day for subsequent convictions.

WHERE TO GET MORE INFORMATION

To receive obtain copies of the clean water regulations for the iron and steel manufacturing and the electric power generation sectors, please call the Ontario Ministry of Environment and Energy's Public Information Centre at **1-800-565-4923.**

Ministry of Environment and Energy

FOR YOUR information

APRIL 1995

Ontario successfully implements clean water regulations

The Ontario government promised tough new regulations to protect Ontario's rivers, lakes and streams from industrial effluent. Now with the promulgation of the electric power generation and iron and steel clean water regulations, all nine industrial sectors have limits placed on the contaminants the companies discharge directly into the waterways. And the government has kept its promise.

Ontario's clean water regulations are issued under the Municipal Industrial Strategy for Abatement (MISA) program and cover nine sectors of the economy:

- petroleum;
- pulp and paper;
- metal mining;
- metal casting;
- industrial minerals;
- organic chemicals;
- inorganic chemicals;
- iron and steel;
- electric power generating.

The clean water regulations are being phased in over the next several years. But they are starting to produce results now.

The *petroleum sector*, for example, has reduced its contaminant loadings for almost all the pollutants by 40 to 60 per cent over 1989 levels - the year companies started monitoring their effluent under the MISA program. The predicted reductions after the regulation came into effect were:

- total suspended solids by 39 per cent;
- volatile suspended solids by 31 per cent;
- dissolved organic carbon by 15 per cent;
- oil and grease by seven per cent;
- ammonia by 11 per cent;
- sulphide by 12 per cent;
- phenolics by 24 per cent;
- total phosphorus by 64 per cent.

Further, all seven refineries are meeting the regulation limits now, even though they do not have to comply until Jan. 1, 1996.

In September 1993, the petroleum refining sector regulation was the first clean water regulation to become law.

The next clean water regulation to go out the door was for the *pulp and paper sector*. Although the companies were given until Jan. 1, 1996 to comply, eight mills out of the 26 pulp and paper mills in the province now meet their limits under clean water and federal regulations.

Further, many mills are making more efficient use of the trees which are cut. These mills are using more recycled fibre and more residue, such as wood chips, from other wood processing operations as their feedstocks. In fact, two mills run on wood residue alone.

The clean water regulation for this sector became law in November 1993.

As the government's goal is to eliminate adsorbable organic halides (AOX) from pulp and paper effluent by 2002, the pulp and paper mills which use compounds containing chlorine for bleaching pulp must reduce their AOX discharges to:

- 1.5 kilograms (kg) per tonne of pulp on Dec. 31, 1995;
- 0.8 kg per tonne of pulp by Dec. 31, 1999.

Further, each of the kraft mills must prepare a series of AOX elimination reports which outline the mill's plan to meet the government's goal.

Also, by Dec. 31, 1995, all mills must reduce:

- BOD5 (biochemical oxygen demand) and toluene discharges by 85 per cent from their 1990 levels; (BOD5 measures the amount of oxygen needed by micro-organisms to break down organic waste over five days);
- phenol discharges by 88 per cent from their 1990 levels;
- chloroform discharges by 96 per cent from their 1990 levels.

The clean water regulations for the remaining seven sectors were promulgated in mid-to-late 1994 and early 1995. These regulations are being phased in to give the companies a chance to alter their processes and production technologies to help clean up Ontario's waterways.

- The metal mining sector will reduce its discharges of copper, nickel, zinc, cyanide and arsenic by 40 per cent by Aug. 26, 1997.
- The industrial minerals sector will reduce suspended solids to a monthly average of 25 milligrams per litre by Aug 26, 1997.
- The metal casting sector will meet its limits by Aug. 26, 1997.
- The organic chemical sector will reduce its discharges of toxic chemicals by 50 per cent by Feb. 16, 1998.
- The inorganic chemical sector will reduce its discharges of toxic chemicals by 16 per cent by Feb. 16, 1998.
- The iron and steel sector will reduce its annual discharges of non-conventional and persistent toxic compounds by 81 per cent and its loadings of conventional contaminants by 54 per cent by April 13, 1998. (Non-conventional and persistent toxic compounds in this case include the volatiles, benzene and styrene, and polynuclear aromatic hydrocarbons such as benzo(a)pyrene. Conventional contaminants include suspended solids, oil and grease.)
- Electric power generators will reduce their discharges of pollutants by some 770 tonnes a year by April 13, 1998.

MISA AND THE CLEAN WATER REGULATIONS

The MISA program was introduced in 1986 to identify and reduce the pollutants discharged from industrial and municipal sources into the waterways. The goal is the virtual elimination of persistent toxic substances from effluent which are discharged into Ontario's lakes, rivers and streams. Also the effluent must not kill fish or water fleas.

The first phase of the program was to monitor the effluent from 300 industries which discharged their effluent directly into rivers, lakes and streams. That was completed in 1991.

MISA's second phase began in 1993 when the Ministry of Environment and Energy released the clean water regulations for the petroleum and pulp and paper industries. The regulations for industrial minerals, metal casting, organic chemicals and inorganic chemicals and metal mining were issued in 1994.

With the promulgation of the regulations for iron and steel manufacturing and electric power generating sectors the MISA industrial program has been completed.

The clean water regulations confirm Ontario's commitment to the Canada-U.S. Great Lakes Water Quality Agreement. They help to meet the goal of the Remedial Action Plans in the 17 Areas of Concern which the International Joint Commission pinpointed on Ontario's side of the Great Lakes. And, with the provincial commitment of more than $600 million to improve water and sewage systems, the regulations testify to the province's determination to protect Ontario's lakes, streams and rivers.

FOR FURTHER INFORMATION:

Please contact the Ministry of Environment and Energy's Public Information Centre at (416) 323-4321. Callers outside Toronto can reach the Centre toll-free at 1-(800) 565-4923.

Ministry of Environment and Energy

FOR YOUR information

JUNE 1995

How Acid Rain Affects Forests, Crops and Wildlife

INTRODUCTION

Symptoms of forest decline have been observed in areas of North America for many years. The visible signs include dieback of twigs and branches in the tree crown, the production of smaller leaves and premature autumn coloration in foliage. The current decline of maple and hardwood in Canada appears to be more severe and more extensive than those of the past. Studies conducted in Ontario and Quebec indicate that acid deposition — and other air pollutants transported over long distances — may be contributing to forest decline.

THE ROLE OF THE FOREST

Forests play a vital role in the life of our plant. Through photosynthesis, carbon dioxide and water react with sunlight to form organic matter and generate oxygen. This process allows plants to store energy derived from the sum and provide the basic carbon materials which become plant tissues.

Plants produce foliage, woody tissues, roots, flowers, fruit and seeds. Eventually, all these fall to the soil. Dead leaves , tree litter, fallen wood and dead roots provide the sources of energy and nutrients for fungi, bacteria, insects, earthworms and other animals. The living forest provide shelter, nesting sites and food for many animal species and helps to store water.

In addition, forests support the economy through the lumber industry , hunting fishing and recreational activities.

THE EFFECTS OF ACID RAIN

Sulphur dioxide (SO2), is a major source of acidity in rain. In sufficient concentrations, sulphur dioxide can be toxic to foliage. In the presence of water, sulphur dioxide is converted to sulphuric acid. In the form of acid rain, sulphuric acid is deposited on soil and affects soil chemistry.

The other major acidic component of acid rain is nitric acid which is derived from nitrogen oxides (NOx). Contrary to the effects of sulphur dioxide, nitrogen compounds may stimulate plant growth. This stimulation may be beneficial on a short term basis but in the long term, the effects are harmful and nitrogen may be released to the aquatic system.

The majority of terrestrial scientists would agree that the impact of acid rain does not directly destroy the above ground parts of the plants. What acid rain does is disrupt the natural soil processes. This includes leaching of soil nutrients and a reduction in nutrient status (calcium, magnesium and potassium), which leads to decreases in soil pH. Under conditions of low soil pH (less than 5.2), there is an increased availability of aluminum. Aluminum. in turn, can be toxic to plant roots and soil organisms.

This is a slow process.

At first, soils are able to counter inputs of acidic materials. Eventually, however, the basic soil chemicals will be used up and the entire buffering capability of the soil will be lost. The soil acidity will increase very rapidly and adversely affect the terrestrial ecosystem. Due to differing soil composition in different regions, this will not occur geographically in a uniform manner. In addition, the time scale for this phenomenon could vary widely from afewyears to a few centuries.

SUMMARY OF CLASSIFICATION OF TERRESTRIAL (SOIL) SENSITIVITY TO ACID DEPOSITION IN ONTARIO

The capacity of soils to tolerate acidic inputs has been classified based on soil chemistry, texture and depth. The relative areas falling into each sensitivity class are shown in the table below.

Class	Total area (km^2)	%ofProvince
Highly Sensitive	335,000	31.3
Moderately Sensitive	192,000	18.0
Non-sensitive	247,000	23.1
Organic (not rated)	295,000	27.6

FOREST AREAS AT RISK

The forest most likely to be affected are those on soils which are shallow, sandy and/or have limited pools of buffering chemicals. Such conditions are prevalent in the Precambrian Shield area of Canada.

The areas most likely to affected include the Muskoka and Parry Sound districts of Ontario where acid rain may enhance the decline of sugar maple trees. Areas further in Ontario or in Quebec have similar soil conditions, but because they are further from the sources of pollution, the amounts of acid deposited are lower and the acidification process proceeds more slowly.

Much of the recent severe dieback of sugar maples in Ontario was associated with the defoliation by the Forest Tent Caterpillar, especially in the Muskoka/Haliburton areas. Experiments have shown that growth of the insect was greater on foliage subjected to acidic conditions and the caterpillars matured earlier. In recent years, the Gypsy Moth has been spreading northward in Ontario and could create an additional problem for the forests.

Severe dieback of white birch trees in the shoreline area of Lake Superior, especially in the Wawa area and at other sites in Ontario have been under investigation. Potential causes of the dieback may have involved acidic precipitation or acidic marine fog. Soils in this area are coarsely textures and extremely acidic. Natural succession of plant communities changes induced by climatic shift cannot be discounted.

ECONOMIC CONSEQUENCES OF HARDWOOD DECLINE

- Associated with the acid rain question is the rapid reduction in growth rate of sugar maple trees since about 1960. Reduced growth rates are more evident in areas subjected to atmospheric contaminants. In southwestern Ontario, acid rain and ozone are co-deposited and it is difficult to asses their relative contributions to the reduced growth rate.

  With reduced rates of growth, less timber will be produced for future harvests. Salvage cutting of affected trees in areas where dieback is encountered is a short term solution and disrupts timber harvest plans.

- Quebec produces about 70 percent of the world's maple syrup and some 15,000 producers in North America rely on the sugarbush for at least part of their income.

- Although it is difficult to assess, loss of forest cover could have a major impact on non-timber forest resource utilization such as hunting and tourism.

RISKS FOR AGRICULTURAL PRODUCTION

Results of experimental studies indicate that repeated occurrences of highly acidic rain or fog with a pH of less than 3.0 will increase the likelihood of foliar damage to agricultural crops. (Rain in the absence of pollution is expected to have a pH of 5.6, resulting from dissolved carbon dioxide which is naturally present in the atmosphere.) Direct damage has not been certified under natural conditions as the pH of typical rainfall is about 4.2 in southern Ontario.

Acidic deposition could result in soil pH depression. This would increase the frequency of application of agricultural limestone to the crop land. It would be very difficult to attribute any increased demand for lime application when normal agricultural practices, including application of nitrogen-based fertilizers, will also result in soil acidification.

RISKS FOR WILDLIFE

- Large scale losses of the tree canopy are predicted to lead to a decreased abundance of birds that rely on the canopy for food and shelter.
- Conversely, some bird species that feed among shrub layers on the ground may have increased habitat.
- Following soil acidification, metals and other contaminants, especially cadmium, become more available for uptake through roots of the plants on which animals feed. As a result, these metals can be accumulated in the tissues of wildlife in remote areas which are sensitive to acidification.
- Metals are known to accumulate in lichens which are a food source for wildlife. Moose and deer have accumulated such high concentrations of cadmium in their livers and kidneys that these organs have been declared unit for human consumption in several provinces in Canada.

FOR MORE INFORMATION

Ministry of Environment and Energy has several information pieces about acid rain and other topics. These are available through the ministry's Public Information Centre, located at 135 St. Clair Ave. W., Toronto, Ontario M4V 1P5. The Public Information Centre is open Monday through Friday, from 9:00 a.m. to 4:30 p.m.

Or call:

Outside of Toronto **1-800-565-4923**
in Toronto **323-4321**

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George H. Tomlinson "Effects of Acid Deposition on the Forests of Europe and North America" 1990.

The 1990 Canadian Long-Range Transport of Air Pollutants and Acid Deposition Assessment Report, Part 5, Terrestrial Effects. 1990

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Ministry of Environment and Energy

FOR YOUR information

SEPTEMBER 1995

Climate change and greenhouse gases

CLIMATE CHANGE AND THE GREENHOUSE EFFECT

Climate change is an important environmental concern. It refers to the warming of the earth's atmosphere caused by human activities such as industrial and transportation emissions. These cause an increased amount of greenhouse gases to build up in the atmosphere, upsetting the natural, life sustaining balance. As a result, more heat may be trapped next to the earth so it gradually gets warmer.

The greenhouse effect is often confused with climate change. While closely related, the two are not the same.

The greenhouse effect is the natural process that heats the earth's surface, thereby supporting life on earth. Heat from the sun is trapped next to the earth's surface by gases in the atmosphere. These are called greenhouse gases. The greenhouse effect allows some heat to escape into space but traps enough to keep the earth warm day and night.

GREENHOUSE GASES

The key greenhouse gases released by human activity are:

- Carbon dioxide(CO_2): This is the predominant greenhouse gas. It is increasing in the atmosphere principally through the burning of fossil fuels, such as oil, coal and natural gas, and deforestation. It makes up 80 per cent of Canada's greenhouse gas emissions.

- Methane (CH_4): Methane is released from rice paddies, enteric fermentation (intestinal gases, particularly from farm animals), gas leakage from landfills and the production and use of natural gas. Its estimated contribution to Canada's greenhouse gas emissions is 13 per cent.

- Nitrous oxide (N_2O): N_2O is formed in the combustion of vegetation and fossil fuels but its principal sources from human activity in Ontario are probably nitrogen fertilizers and nylon manufacturing. Nitrous oxide's estimated contribution to national greenhouse gas emissions is five per cent.

Other gases also play a role:

- Ozone (O_3): This is a greenhouse gas as well as a pollutant in the lower atmosphere (troposphere). Additional information on its relative atmospheric role is required to determine its contribution to the problem.

- Chlorofluorocarbons (CFCs): CFCs are present in the atmosphere at extremely low concentrations but they are powerful global warming gases. They also deplete atmospheric ozone which protects us from the harmful ultraviolet rays of the sun. If the ozone depletion occurs in the lower regions of the atmosphere, then there could be surface cooling effects since ozone is also a greenhouse gas. Recent studies suggest the direct radiative effects of CFCs may be offset somewhat by the cooling effects due to ozone

depletion in the lower atmosphere, especially in the mid-latitudes.

- Hydrochlorofluorocarbons (HCFCs): HCFCs are substitutes for, and similar to, CFCs. They are also powerful global warming gases. They deplete ozone, but not as voraciously as CFCs. Because of their reduced ozone depletion properties, the global warming effects of HCFCs are not offset to as great an extent by the surface cooling effects.

- Fully fluorinated gases such as sulphurhexafluoride (SF6), hexafluorethane (C2F6) and tetrafluoromethane (CF4): These are not released in large quantities. However they are becoming increasingly important due to their extremely long atmospheric lifetime. SF6 is used for electrical insulation, magnesium production and science laboratories. C2F6 and CF4 are emitted by aluminum smelters.

THE EFFECTS OF CLIMATE CHANGE

In Canada, it's easy to get the impression that climate change will simply mean more warm weather to enjoy. However scientists agree that there are serious and severe implications to warming global temperatures.

Serious effects are expected both globally and at home:

- Heat waves: Prolonged periods of high temperatures are likely to become more common.

- Storms: Frequency and intensity of severe weather may increase.

- Changes in precipitation: Increases or decreases in precipitation in some areas may increase droughts or flooding. In central North America, decreases in precipitation are predicted with increasing temperatures. Water supplies for drinking, shipping and hydro power generation may be affected adversely.

- Sea level rise: Ocean levels will rise due to thermal expansion of water and the melting of land-based ice. Coastal communities like those on Hudson's and James Bay may experience erosion, wetland loss and salt water intrusions into freshwater systems. Human impacts already include large expenditures to construct dykes and may include increases in the number of environmental refugees.

- Soil erosion in Northern Ontario could develop into a more serious agricultural and environmental problem.

- Plant and animal productivity may decrease in both natural and agricultural systems. Since the effects of climate warming would be relatively greater in northern parts of Ontario, northern crop choices are likely to change. Forestry may also be seriously affected.

- Migration of pests: Locusts, aphids and moths become more active in warmer weather and may migrate north.

- Impacts on health such as cardiovascular, cerebrovascular and respiratory diseases may increase. The effects are likely to be greatest on the elderly, chronically ill and the very young. Vector-borne diseases, including malaria, schistomiasis and leishmaniasis are expected to shift north.

A WORLD-WIDE EFFORT TO PREVENT CLIMATE CHANGE

The changing atmosphere: Implications for global security was an international conference held in Toronto in 1988. Scientists at the conference concluded that greenhouse gases in the global atmosphere were being increased primarily by human activity and that the ultimate consequences could be second only to the impact of nuclear war.

The Intergovernmental Panel on Climate Change (IPCC) sponsored jointly by the World Meteorological Organization and the United Nations Environmental Program has made several key determinations.

It confirmed global warming has been recurring in recent decades. It supports models which show that with a doubling of CO2 concentrations, global temperatures would increase 1.5 to 4.5 degrees Celsius. It also underscored areas of scientific uncertainty such as the role and effects of sources and sinks (reservoirs such as oceans that hold greenhouse gases), clouds, oceans and polar ice caps.

The IPCC has predicted a rate of global mean temperature increase of about 0.3-C per decade or 1-C above the present value by 2025 and 3-C by 2100. This is greater than the warming seen over the past 160,000 years.

Canada was one of more than 150 countries to sign the Framework Convention on Climate Change at the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992.

Since ratifying the convention, governments in Canada have been working together with stakeholders to study options for addressing climate change.

In February 1995 Canada's environment and energy ministers approved the National Action Program on Climate Change which sets out a broad framework under which Canada (including Ontario) will work toward stabilizing national greenhouse gas emissions at 1990 levels by the year 2000. This framework will also provide guidance for addressing emissions after that date.

The first step is to stabilize global greenhouse gas emissions. No national or international agreements have been reached to date on further cuts. IPCC and other scientists have calculated the cuts in emissions required to stabilize the current concentrations of greenhouse gases at their current atmospheric levels:

Carbon dioxide - greater than 60 per cent reduction
Methane - 15 to 20 per cent reduction
Nitrous oxide - 70 to 80 per cent reduction
CFC-11 - 70 to 75 per cent reduction
CFC-12 - 40 to 50 per cent reduction
CFC-22 - 40 to 50 per cent reduction

The Montreal Protocol does, however, phase out CFCs by 1996.

ONTARIO ACHIEVEMENTS

In 1989, Ontario became the first North American jurisdiction to ban the manufacture and import of products using CFCs as propellants in aerosol sprays or blowing agents in foam manufacture. In 1994, Ontario promulgated control regulations phasing out CFCs, HCFCs and other ozone-depleting substances used as refrigerants, in fire extinguishers, as solvents and as sterilants.

Many energy-efficiency measures taken in Ontario will contribute to reducing greenhouse emissions. Ontario was the first province to introduce energy efficiency regulations on energy-using products and appliances. The Ontario Building Code sets high levels of insulation for new buildings. The ministry's Home Green-Up program is also increasing energy efficiency.

The Voluntary Challenge Program and Registry — launched under the National Action Program — will encourage all sectors to take cost-effective voluntary actions to reduce greenhouse gas emissions.

HOW YOU CAN HELP

There are several things you can do to help reduce greenhouse gas emissions:

- Conserve energy: Turn off lights and appliances when not in use. Buy energy efficient goods and appliances. Instead of driving, walk, cycle or use public transit whenever possible. If you do drive, keep your car well tuned and turn your engine off rather than let it idle. Calk and weatherstrip your home and check to see your insulation is adequate.

- Reduce, reuse and recycle: The 3Rs of waste management help save energy by reducing the need to manufacture products from scratch and by easing stress on methane-producing landfill sites.

- Use your consumer power: Buy energy-efficient, environmentally-friendly goods that are reusable, recyclable, made from recycled materials, are not over-packaged and are CFC and HCFC-free. Remember if energy-efficient, environmentally-friendly goods are not available at your store, you can always ask that they be stocked.

- Plant trees: Trees absorb and store carbon dioxide. If properly placed, trees can naturally reduce heating and cooling needs by sheltering homes from wind and sun.

- Educate yourself. Read articles. Get information from your public library, government and utilities. Join an environmental interest group.

FOR MORE INFORMATION

The Ontario Ministry of Environment and Energy has more information available on energy conservation, air pollution and other topics. These are available through the ministry's Public Information Centre, 135 St. Clair Ave. W., Toronto, Ontario, M4V 1P5. The centre is open Monday through Friday, from 9:00 a.m. to 4:30 p.m.

Or call:

Outside Toronto	1-800-565-4923
In Toronto	323-4321

Ministry of Environment and Energy

FOR YOUR information

JULY 1996

Water pollution monitoring costs in Ontario Comparison of estimated and actual costs

Summary of report

PURPOSE OF REPORT

The Municipal-Industrial Strategy for Abatement (MISA) program is intended to achieve the "virtual elimination of toxic contaminants in municipal and industrial discharges into Ontario waterways". As a first step in this program, regulations required intensive monitoring of industrial wastewater discharges over 12 months. A total of 237 plants in 9 industrial sectors implemented these monitoring programs between December 1988 and July 1991.

Prior to the implementation of the monitoring programs, industrial representatives and Ministry staff produced estimates of the capital and operating costs of monitoring activities at each plant. Before completing year-long monitoring programs, the plants were sent questionnaires asking for data on the actual expenditures incurred for monitoring.

In this report, monitoring activities required by the regulations are described and key results of monitoring efforts are summarized. This is the first time that actual costs of a regulatory program have been collected in Ontario for comparison with pre-program estimates.

KEY RESULTS OF EFFLUENT MONITORING ACTIVITIES

In addition to the concentration of various chemicals, tests were carried out to determine acidity and acute toxicity. Monitoring revealed different numbers of contaminants or pollution parameters in effluents from each sector.

The contaminants or pollution parameters monitored for and detected varied for each industrial sector. The most parameters, 161, were tested for in Metal Casting plants. The largest number of parameters detected in one industrial sector was 116 at the Organic Chemical plants. Eleven of the 26 Organic Chemical plants monitored had effluents that were acutely lethal to fish and other aquatic organisms. Over half of the samples tested from the Pulp and Paper mills were toxic to aquatic life.

Using monitoring data, abatement cost estimates, and other information on financial impacts, maximum allowable limits were developed for specific pollution parameters in each sector ranging from 59 contaminants in the Organic Chemical Sector plants to 1 parameter for Industrial Minerals plants.

ESTIMATED COSTS OF MONITORING ACTIVITIES

Estimated monitoring costs totalled $73.7 million for 237 plants, or an average of $311,100 per plant. Operating expenses were estimated to represent 65% of the total expenses. Disaggregated estimates were developed for each monitoring activity: sampling ($25.6 million), flow measurement ($12.9 million), characterization ($11.8 million), routine analysis ($16.2 million), toxicity testing ($1.6 million), reporting ($5.1 million) and other ($512,300).

Ontario

The highest total monitoring costs were in the Iron and Steel sector, with 7 plants, averaging $1.2 million per plant. In contrast, the 51 Industrial Minerals plants were expected to incur the least total cost per plant of $38,900. It was estimated that the 7 Iron and Steel plants would incur the highest capital and operating costs per plant; $732,000 and $464,000 per plant respectively.

REPORTED COSTS OF MONITORING ACTIVITIES

Of the 220 plants or mines surveyed, 117 or 53% returned completed questionnaires as shown in Table 1.

Table 1: Response rate of MISA monitoring cost survey

Sector	Number of monitoring plants		
	Received a questionnaire	Fully completed a questionnaire and returned it to MOEE	% of response
Petroleum refining	7	7	100%
Organic chemicals	26	24	92%
Pulp and paper	27	17	63%
Iron and steel	7	1	14%
Metal mining	47	14	30%
Industrial minerals	47	5	10%
Electric power	22	22	100%
Inorganic chemicals	29	25	86%
Metal casting	8	2	25%
Total	220	117	53%

Source: MOEE, Actual Cost of Monitoring Survey, 1991.

As shown in Table 2, these 117 plants reported spending a total of $52.9 million, or an average of $452,000 per plant on monitoring activities. This cost per plant is 45% higher than the $311,000 per plant that was estimated prior to the implementation of the monitoring. Total reported capital and operating costs were split 50-50. Operating expenditures include $10.2 million to hire external consultants. Total capital and operating cost per plant were $224,000 and $228,000 respectively.

Table 2: Total reported capital and operating costs of monitoring by sector

Sector		($'000)		
	# of plants	Capital (1)	Operating (2)	Total
Metal casting	2	5.2	38.5	43.7
Industrial minerals	5	105.2	279.5	384.7
Iron and steel	1	699.3	1,007.2	1,706.5
Metal mining	14	357.8	1,423.9	1,781.7
Petroleum refining	7	1,835.8	2,236.5	4,072.3
Inorganic chemicals	25	1,795.6	2,890.7	4,686.3
Pulp and paper	17	2,470.4	2,691.8	5,162.2
Organic chemicals	24	5,382.8	7,253.6	12,636.4
Electric power	22	13,554.9	8,916.0	22,470.9
Total	117	26,207.0	26,737.7	52,944.7

(1) Actual capital costs include purchased vehicles.
(2) Actual operating costs include consultant and vehicle leased costs.

Source: MOEE, Actual Cost of Monitoring Survey, 1991

The 22 Electric Power Generating plants reported the largest total monitoring expenditures of $22.5 million. The lowest total sector expenditure amounted to $43,700 by 2 Metal Casting plants.

As shown in Table 3, the single reporting steel plant had the largest total monitoring expenditure per plant of $1.7 million.

Metal Casting foundries reported spending the smallest cost per plant; $21,900 per plant.

Total expenditures reported by monitoring function included $14.2 million (26.8%) for sampling, $11.9 million (22.6%) for analytical testing, $10.4 million (19.7%) for flow measurement, $5 million (9.5%) for reporting, and $1.1 million (2.2%) for training, seminars and transportation .

Table 3: Total reported monitoring cost per plant

Sector	($'000)		
	# of plants	Total	Total cost per plant
Metal casting	2	43.7	21.9
Industrial minerals	5	384.7	76.9
Metal mining	14	1,781.7	127.3
Inorganic chemicals	25	4,686.3	187.5
Pulp and paper	17	5,162.2	303.7
Organic chemicals	24	12,636.4	526.5
Petroleum refining	7	4,072.3	581.8
Electric power	22	22,470.9	1,021.4
Iron and steel	1	1,706.5	1,706.5
Total	117	52,944.7	452.5

Note:
(1) Actual capital costs include purchased vehicles.
(2) Actual operating costs include consultant and vehicle leased costs

Source: MOEE, Actual Cost of Monitoring Survey, 1991

External consultants performed chemical analyses ($6.4 million) and toxicity testing ($1.0 million). The 117 reporting plants established 210 consulting contracts with 55 consulting firms, for an average cost of $42,600 per contract.

ESTIMATED AND REPORTED COSTS OF MISA MONITORING ACTIVITIES

Pre-regulation cost estimates and reported costs are available for 99 out of the 117 plants that returned completed questionnaires. Actual and estimated costs for these plants were compared to evaluate the degree of over/under estimation and to determine reasons for such discrepancies. Total estimated monitoring costs for all plants were $7.2 million (14%) less than total reported costs. However, total costs were over-estimated by as much as 248% in the Metal Mining Sector, and under-estimated by as much as 43% in the Electric Power Sector. Under-estimation of the Electric Power sector was due to the fact that additional monitoring requirements, not included in the cost estimates, were imposed in the monitoring regulations.

The range of error varied from -40%/+19% in the Petroleum Refining Sector to +65%/+1,053% in the Metal Mining Sector.

Statistical analyses demonstrated that estimated monitoring costs in the Petroleum, Pulp and Paper and Organic and Inorganic Chemical sectors were good estimators of the actual costs.

Table 4: Reporting versus estimated total monitoring costs by sector

Sector	Number of plants (for which both estimated and reported costs are available)	Estimated capital costs ($'000)	Reported capital costs* ($'000)	Capital costs % difference (EST — REP/REP)	Estimated operating costs ($'000)	Reported operating costs** ($'000)	Operating costs % difference (EST — REP/REP)	Estimated total costs ($'000)	Reported total costs ($'000)	Total costs % difference (EST — REP/REP)
Petroleum refining	7	1,575.0	1,835.8	-14%	2,081.0	2,236.5	-7%	3,656.0	4,072.3	-10%
Organic chemicals	14	2,024.0	4,900.9	-59%	5,335.3	6,325.9	-16%	7,359.3	11,226.8	-34%
Pulp and paper	17	2,189.2	2,470.4	-11%	3,545.4	2,691.8	32%	5,734.6	5,162.2	11%
Iron and steel	1	1,981.9	699.3	183%	851.0	1,007.2	-16%	2,832.9	1,706.5	66%
Metal mining	14	2,134.7	357.8	497%	4,060.4	1,423.9	185%	6,195.1	1,781.7	248%
Industrial minerals	3	14.5	15.5	-6%	133.1	115.9	15%	147.6	131.4	12%
Electric power generation	22	5,274.7	13,554.9	-61%	7,558.2	8,916.0	-15%	12,832.9	22,470.9	-43%
Inorganic chemicals	19	1,189.2	1,704.7	-30	3,636.5	2,614.3	39%	4,825.7	4,319.0	12%
Metal casting	2	3.3	5.2	-37%	30.2	38.5	-22%	33.5	43.7	-23%
Total	99	16,386.5	25,544.5	-36%	27,231.1	25,370.0	7%	43,617.6	50,914.5	-14%

Note:
** Actual capital costs include purchased vehicle costs.*
*** Actual operating costs include consultant and vehicle leased costs.*

Source:
Estimated costs – various MISA estimated monitoring cost reports prepared by MOEE.
Reported costs – MOEE, actual cost of monitoring survey, 1991.

EMPLOYMENT ASSOCIATED WITH MONITORING REQUIREMENTS

The 117 survey respondents reported that a total of 106 persons were hired to perform in-house monitoring activities. Of these 106, 62 were hired on a permanent basis while 44 were hired temporarily for one year as shown in Table 5. Organic Chemical plants hired the largest number of additional employees, consisting of 23 permanent and 16 temporary persons. Ontario Hydro employed an added 18 people on a permanent basis.

Table 5: Reported number of additional employees hired in-house to perform MISA monitoring activities

Sector	Permanent		Temporary		Total
	Full-time	Part-time	Full-time	Part-time	
Petroleum refining	4	0	2	1	7
Organic chemicals	21	2	12	4	39
Pulp and paper	8	1	3	1	13
Iron and steel	1	0	2	0	3
Metal mining	0	1	5	0	6
Industrial minerals	0	0	0	0	0
Electric power	15	3	4	7	29
Inorganic chemicals	6	0	1	2	9
Metal casting	0	0	0	0	0
Total (117 plants)	55	7	29	15	106

Source: MOEE, Actual Cost of Monitoring Survey, 1991.

The 117 survey respondents reported a total of 343,416 person hours to perform in-house monitoring activities. As shown in Table 6, reported operating costs per total person in-house hours were much higher and ranged between $63.40 per hour in the Petroleum sector to $161.80 per hour in the Metal Casting Sector.

Table 6: Monitoring person hours as a % of reported monitoring costs

Sector	Reported operating costs ($'000)	In-house person hours	Operating costs per total person hours ($/hr)
Petroleum refining	2,236.5	35,282	63.4
Organic chemicals	7,253.6	89,355	81.2
Pulp and paper	2,691.8	36,308	74.1
Iron and steel	1,007.2	14,978	67.2
Metal mining	1,423.9	16,860	84.4
Industrial minerals	279.5	2,917	95.8
Electric power	8,916.0	108,693	82.0
Inorganic chemicals	2,890.7	38,785	74.5
Metal casting	38.5	238	161.8
Total (117 plants)	26,737.7	343,416	n/a

Source: MOEE, Actual Cost of Monitoring Survey, 1991.

Required in-house person hours to perform various monitoring activities differed greatly among sectors; from 119 person-hours per plant in the Metal Casting sector to as high as 14,978 person- hours for the one reported Iron and Steel plant. Total person in-house hours by monitoring function were 127,135 hours (37%) for analytical testing, 114,469 hours (33%) for sampling, 81,098 hours (24%) for reporting and 20,714 hours (6%) for flow measurement.

CONCLUSIONS

Estimated compliance costs for individual sectors and individual plants provide the basis for assessing the cost-effectiveness and the financial and economic implications of proposed regulations or policies prior to their implementation. However, these estimates are seldom verified by comparing them against actual costs incurred. The 117 plants which responded to the survey questionnaire reported actual monitoring expenses averaging $452,000 per plant. If this average monitoring cost applied across the 273 plants covered by the monitoring regulations, total plant monitoring costs to comply with the regulations would have been $123.5 million.

Of the 117 respondents to the survey, only 99 plants also had cost **estimates** generated. Estimated total monitoring costs for these 99 plants were only 14% lower than total actual costs obtained from the survey. The major discrepancy was with the capital costs which were 36% lower than the reported costs.

The largest discrepancies between estimated and reported **capital** costs were found in Electric Power, Organic Chemicals, Metal Mining and Iron and Steel plants. According to industry sources, capital costs are often underestimated because installation of instrumentation and construction of facilities is frequently more complex and costly than anticipated. Moreover, actual capital monitoring costs for Electric Power plants were higher than estimates because additional monitoring requirements were imposed by the regulation which were not included in the estimates.

Estimated **operating** costs were 7% higher than survey costs. The largest difference between estimated and actual operating costs was in the Metal Mining sector, where estimated operating costs were 185% higher than the actual reported costs. About 74% of this difference was due to an overestimation of costs to hire external consultants.

The range of error (level of accuracy) of estimates was calculated for each industrial plant and sector. For example, monitoring cost estimates for Petroleum refineries were under-estimated by as much as 40% or over-estimated by as much as 19%.

Consequently, the estimated monitoring expenditures derived for the Petroleum, Pulp and Paper, Organic and Inorganic chemical sectors are good predictors of the values of the actual costs.

The Economic Services Branch has produced and analyzed estimates of pollution abatement and prevention costs for many types of environmental issues. Compliance cost estimates provide the basis for assessing cost-effectiveness and the financial and economic implications of proposed regulations and policies. However, these estimated are seldom verified by comparing them against actual costs incurred. Determination of the accuracy of cost estimates will provide a stronger basis for developing future environmental policies.

FOR MORE INFORMATION

For more information, please contact:

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Toronto, Ontario M4V 1P5

Fax: (416) 323-5881

FACTS

Ontario
Ministry of the Environment
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

ABOUT WATER TREATMENT PLANT OPERATION

WFS8

Introduction

The Ontario Ministry of the Environment is the Ontario government agency responsible for the management of water resources throughout the Province of Ontario.

As part of the water management function, the Ministry keeps close check on the quality of all municipal water supplies, and builds and operates water treatment plants and facilities for municipalities and areas.

This Fact Sheet outlines the treatment method and equipment used to purify surface water for community use. This type of treatment is typical for larger communities. There are a number of other methods for smaller applications.

The object of treatment is to use the most effective processes and equipment for the removal of impurities inherent in a specific source, and to render the water odourless, colourless, free from undesirable chemicals and bacteriologically safe.

Intake

To obtain water from a surface source, an intake crib is built in deep water some distance from the shore. From the intake crib an intake pipe carries the water to a low lift pumping station located on the shore. Screening devices across the intake and within the low lift station prevent entry of fish and other objects. The screened water is then pumped to the treatment plant.

Microstrainer

Where there is a relatively large amount of algae in the raw water, it may be screened again. The screening unit, called a microstrainer, is a revolving drum covered on the outside with a finely woven stainless steel cloth.

The raw water enters the centre of the drum and passes out through the screen cloth, which entraps algae and other foreign materials. The strainer is continuously backwashed to remove the accumulated impurities, which are discharged to a waste hopper.

Flocculation and Sedimentation

From the microstrainer, the water flows to a large concrete tank called a "Flocculator". This is a chamber designed to allow for the intermixing of chemicals and water to coagulate the impurities contained in the water together for easy removal in the settling basin following.

The coagulating chemicals, such as alum, are added automatically by chemical feeders which operate in relation to the flow entering the flocculator. The tank contains large paddles which constantly agitate the contents to prevent settling.

From the flocculators the water passes into a sedimentation (settling) basin where it is retained for a period to allow the accumulated clusters (floc) time to settle to the bottom for removal and disposal.

Sand Filters

The partially treated water then passes into the filtering stage, which consists of gravity filters.

The filters are concrete tanks into which have been placed straining systems, called the filtering "media". The media consist of layers of finely graded sand or anthracite coal over layers of graded gravel which rest upon an underdrain system of perforated pipes.

In the filtering operation, the partially treated water flows over the top of the filter media and passes down through to the underdrains and

out into a clear water reservoir. Impurities contained in the water are trapped in the media.

Periodically, the filters are taken out of service and backwashed by forcing clean water up through the media at a high rate. The accumulated impurities are scoured out from within the sand layer into wash water troughs and discharged to a waste sewer.

Chlorination

The purified water accumulates in a clear water reservoir where it is chlorinated to ensure complete disinfection before discharge to the community.

The chlorine is fed automatically in proportion to the flow entering the reservoir.

Laboratory Facility

It is vital that a constant check be kept on the quality of the water in process and leaving the plant.

This is done by the operating staff in the plant laboratory where every aspect of treatment and final delivery is closely watched and analyzed.

This ensures the highest quality possible for delivery to the consumer.

Plant Operation

Water treatment plants, as described in this fact sheet, and smaller installations, are staffed by specialists in the field of plant operations throughout Ontario.

A visit to a local plant to see what is being done to provide safe drinking water for your community is suggested.

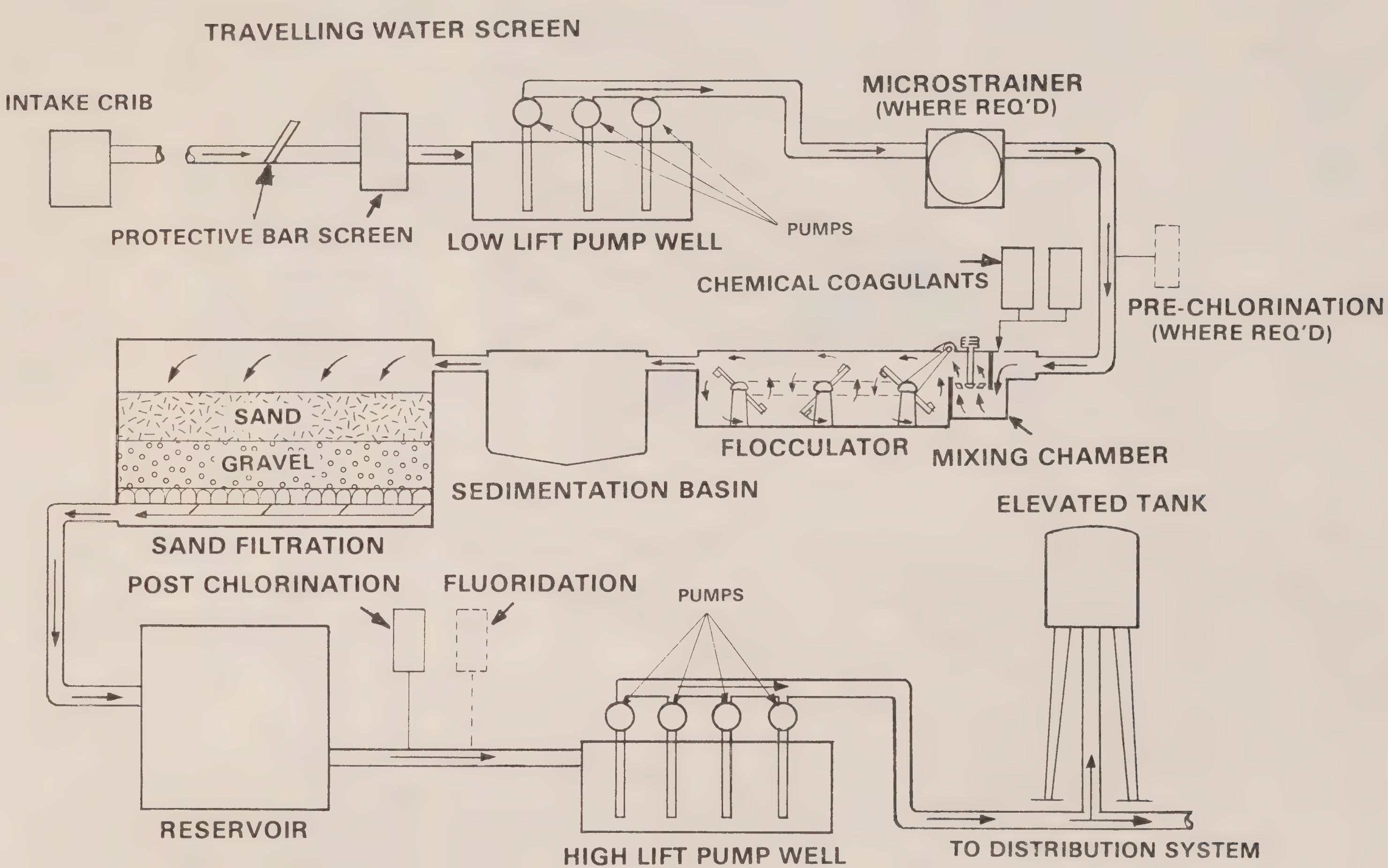
Additional information on the operation and maintenance of a water treatment plant may be obtained from the superintendent of the Environment Ontario or municipally operated plant in your area.

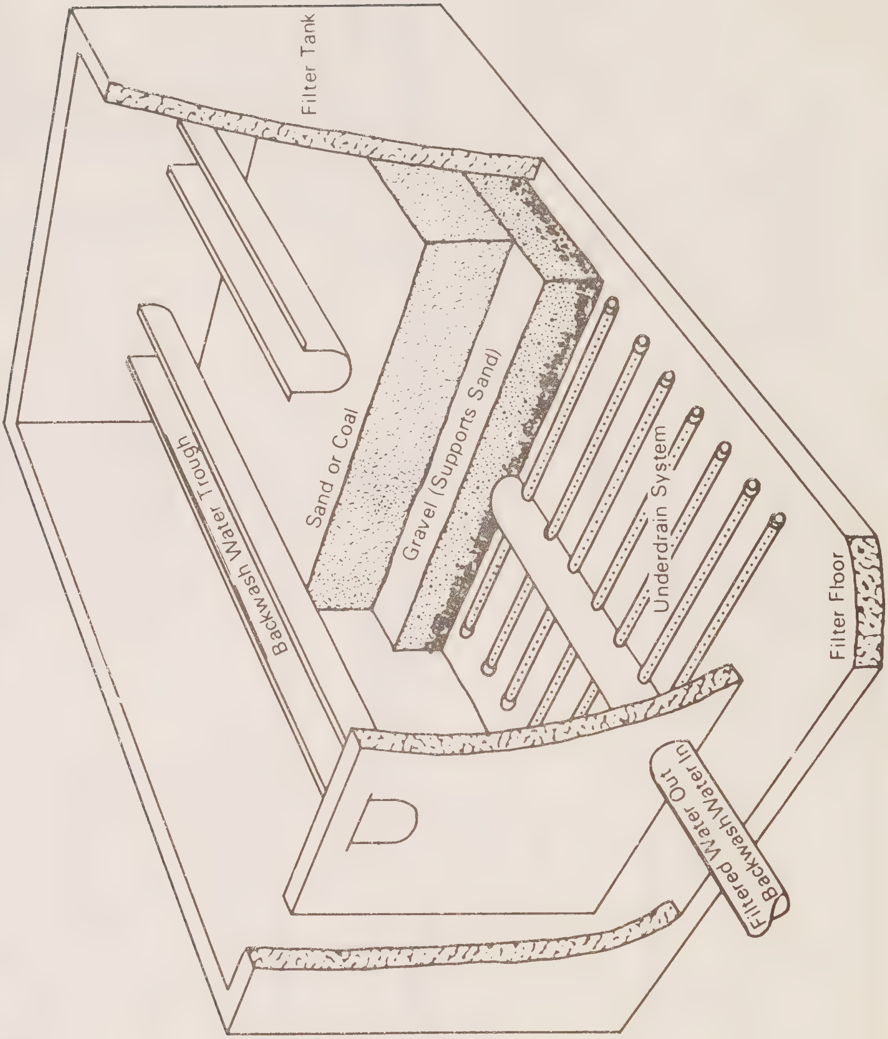
* * * * *

(A schematic of a typical water treatment plant and a sand filter is reproduced on pages 3 and 4.)

Tour Notes and Observations

WATER TREATMENT PLANT FLOW DIAGRAM




Filter Tank
Backwash Water Trough
Sand or Coal
Gravel (Supports Sand)
Underdrain System
Filter Floor
Filtered Water Out
Backwash Water In

FAITS

Ontario
Ministère de l'Environnement
l'hon. Keith C. Norton, c.r., Ministre
Gérard J. M. Raymond Sous-ministre

FONCTIONNEMENT D'UNE STATION DE TRAITEMENT DE L'EAU

WFS8

Avant-propos

Le Ministère de l'environnement de l'Ontario est un organisme gouvernemental responsable de la gestion des eaux dans l'Ontario.

Le contrôle de la qualité des ressources aquatiques, la construction et l'exploitation de stations d'épuration pour les municipalités et les régions font partie des tâches du Ministère.

Cette page de faits donne un aperçu des méthodes et de l'équipement utilisés pour purifier les eaux de surface employées par les municipalités. Ce type de traitement est caractéristique dans les grands centres urbains. Il existe d'autres méthodes adaptées à de plus petites communautés.

Le traitement consiste à utiliser les méthodes les plus efficaces pour filtrer les impuretés contenues dans l'eau afin de la rendre incolore, inodore, et exempte de substances chimiques et bactériologiques dangereuses.

Prise d'eau

Pour capter des eaux de surface, on construit une prise d'eau en eau profonde suffisamment loin du bord. Un tuyau amène les eaux captées à une station de pompage à faible élévation sur la rive. Des grilles de nettoyage arrêtent les poissons et autres objets indésirables à l'entrée de la prise d'eau et de la station de pompage. L'eau filtrée est ensuite pompée dans la station de traitement.

Micro-tamis

Quand l'eau contient une quantité d'algues relativement grande, elle est filtrée une seconde fois. Le filtre, appelé micro-tamis, est un cylindre recouvert d'une toile en acier inoxydable, tissée très serrée.

L'eau arrive dans le centre du cylindre et passe à travers le tamis, qui retient les algues et les autres objets indésirables. Le tamis est nettoyé continuellement par retour d'eau afin d'enlever les impuretés qui s'y sont accumulées. Ces rejets sont versés dans une trémie.

Floculation et sédimentation

A la sortie du micro-tamis, l'eau s'écoule dans un grand réservoir en béton appelé le "floculateur". Ce bassin est conçu pour permettre à un mélange de substances chimiques et d'eau de coaguler les impuretés. Ces impuretés se déposeront au fond d'un autre bassin pour en faciliter l'évacuation.

Des coagulants chimiques, comme l'alun, sont versés automatiquement par un appareil qui marche en fonction de l'importance du flot pénétrant dans le floculateur. Des grandes palles agitent sans arrêt le contenu du réservoir pour empêcher la décantation.

Une fois sorties du floculateur, les eaux passent dans un bassin de sédimentation (décantation) où elles sont retenues suffisamment longtemps pour permettre aux traînées d'impuretés de se déposer au fond, d'où elles sont enlevées et amenées à une décharge.

Filtres à sable

L'eau partiellement traitée passe ensuite dans des filtres à gravité.

Les filtres sont des réservoirs en béton dans lesquels on a placé un système de filtre, appelé "média" de filtrage. Le "média" est constitué de couches de sable fin ou d'anthracite intercalées avec du gravier, qui reposent sur un

système de tuyaux perforés.

Dans l'opération de filtrage, les eaux se déversent sur le dessus des filtres "média" et s'écoulent par les tuyaux dans un bassin d'eau claire. Les impuretés contenues dans l'eau sont arrêtées par le média.

Les filtres-média sont périodiquement enlevés et nettoyés avec de l'eau claire envoyée sous pression. L'eau de nettoyage récure les impuretés qui se sont accumulées dans les couches de sable et va les déposer dans une canalisation pour les rejets.

Chloruration

L'eau purifiée est emmagasinée dans un réservoir d'eau claire où elle est chlorée pour garantir une désinfection complète. Elle est ensuite propre à la consommation.

La chloruration se fait automatiquement en fonction du flot qui pénètre dans le réservoir.

Laboratoire

Un contrôle constant du procédé de traitement et de la qualité de l'eau distribuée aux consommateurs est absolument nécessaire.

Le personnel du laboratoire de la station est chargé du contrôle du traitement et de l'analyse de l'eau traitée.

Ceci garantit la meilleure qualité possible aux consommateurs.

Fonctionnement de la station

Les stations de traitement, comme celles que nous avons décrites, ou les plus petites installations emploient des spécialistes. Elles sont situées dans toute la province de l'Ontario.

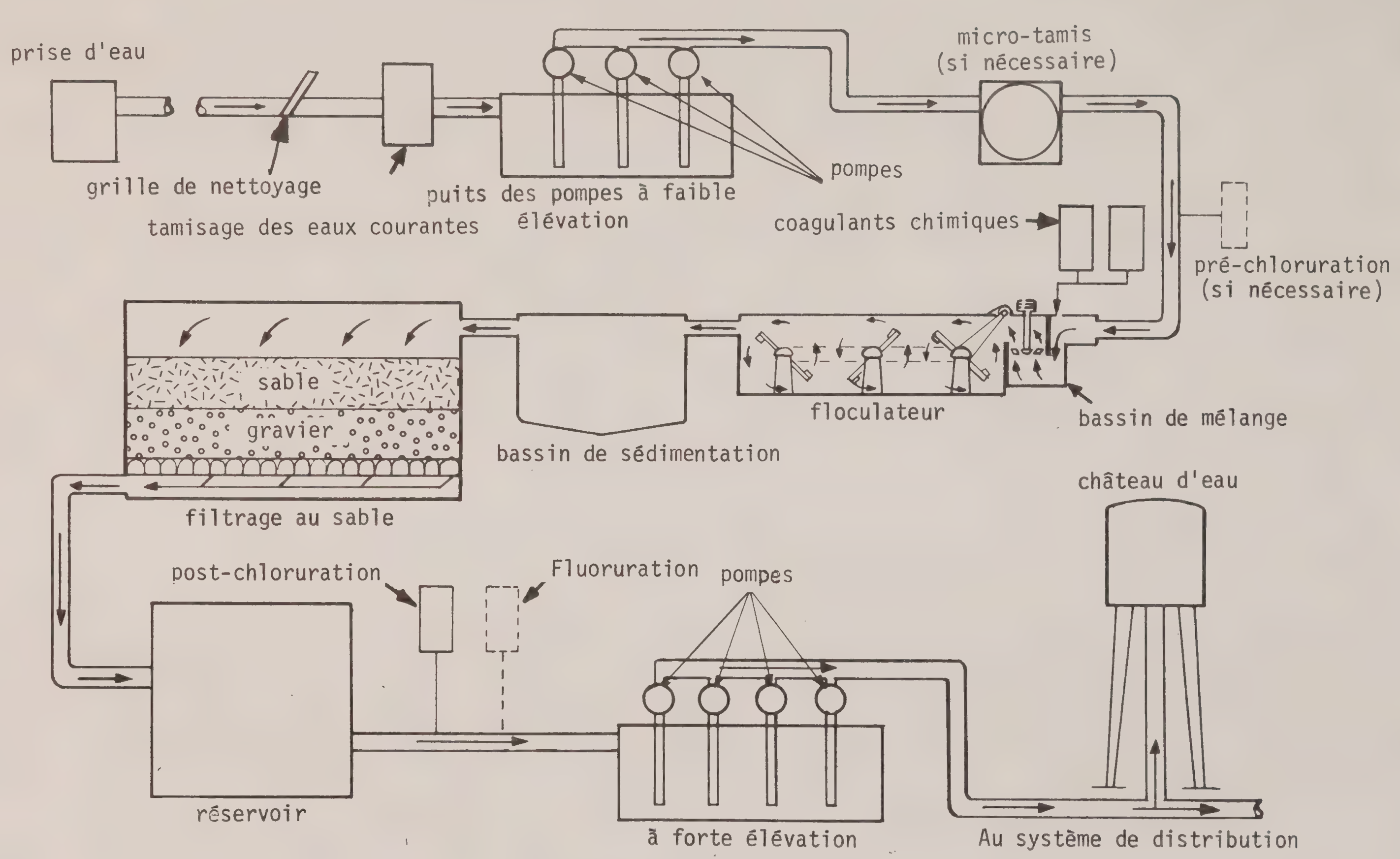
Nous vous en suggérons la visite; vous pourrez alors voir ce qui est fait pour fournir de l'eau potable à votre communauté.

Des renseignements supplémentaires concernant le fonctionnement et l'entretien des stations d'épuration peuvent être obtenus auprès du superintendant de la station provinciale ou municipale de votre région.

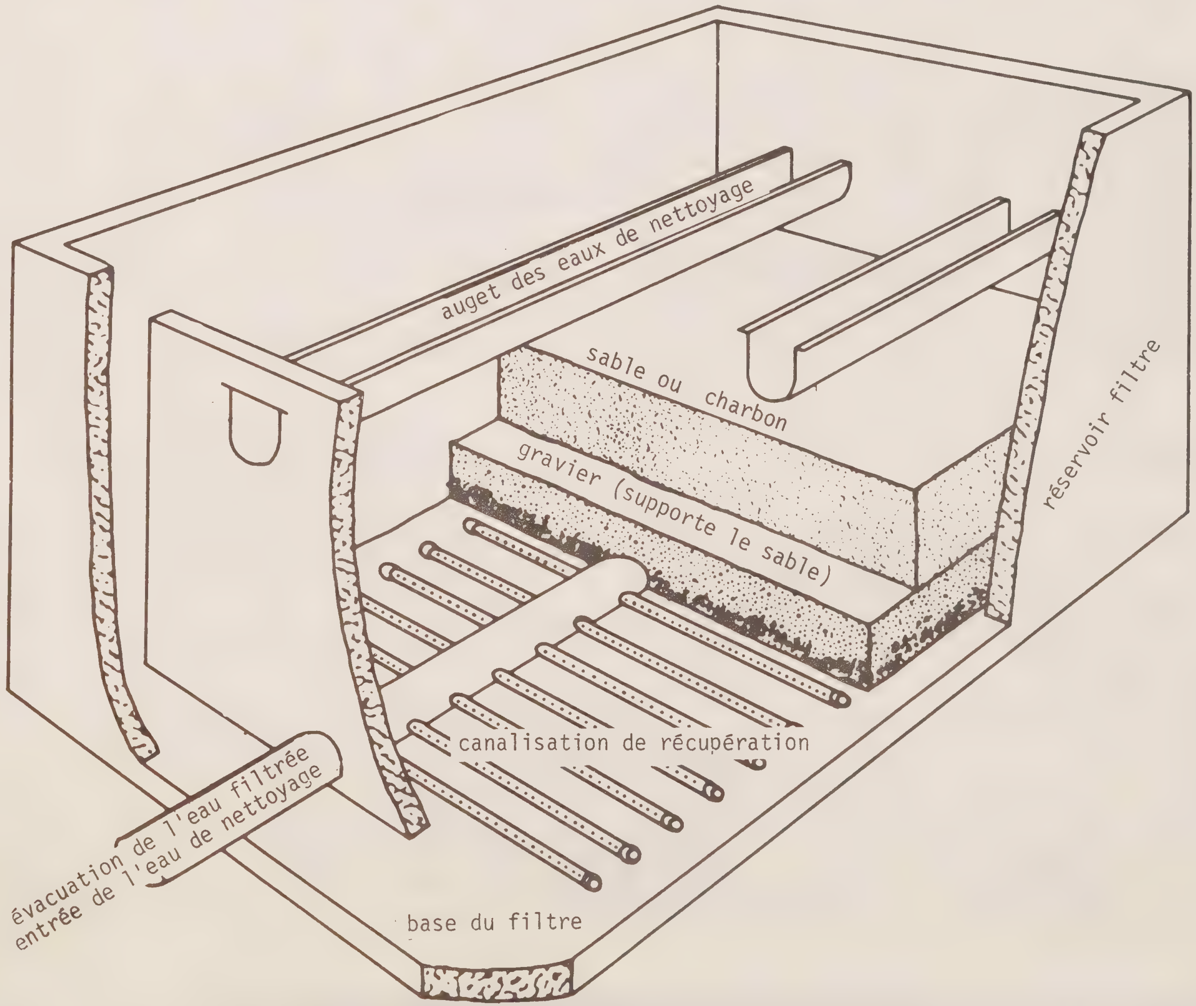
Remarques et observations de la visite

(Un schéma d'une station de traitement typique est reproduit pages 3-4 ...3).

Diagramme de l'écoulement de l'eau dans une station de traitement



Filtre média d'une station de traitement de l'eau



FACTS

Ontario
Ministry of the Environment
Hon. Jim Bradley
Minister
Rod McLeod
Deputy Minister

ABOUT WATER

Publication Code:
WFS9

WATER POLLUTION CONTROL PLANT OPERATION

Introduction

The Ontario Ministry of the Environment is the government agency responsible for water management in the Province of Ontario.

One of its tasks is the provision of clean water through pollution prevention. One source of pollution is municipal wastewater which contains an average of one pound of solids in every 500 gallons. A town with a population of 10,000 could discharge up to 2,000 pounds of solids each day to a lake or stream in untreated wastewater.

There are a number of treatment methods used to reclaim community wastewater. The one most widely used in larger urban areas is the activated sludge process. A water pollution control plant of this type provides for complete biological treatment, removing from 90 to 95 per cent of solids for a high quality outflow or "final effluent".

Influent Works

The municipal wastewater enters the water pollution control plant through influent channels located under the influent building.

Upon entering the channels it passes through screens and shredding devices. The screens prevent entry of large objects which may damage equipment and the shredding devices cut the larger particles to a size suitable for handling in the treatment units which follow.

Grit Removal

From the shredder, the wastewater flows into a collector well; from there it is pumped up to the grit removal facilities located adjacent to the building housing the influent works.

The grit removal facilities receive and delay the flow long enough to allow the heavier particles of grit and sand to settle to the bottom of the tanks for removal. This material, if not removed, interferes with the operation of the digesters and could damage machinery in the treatment units following.

Periodically, the settled grit and sand is removed and taken to a disposal area.

Primary Settling

From the grit chambers, the wastewater flows into the primary settling tanks. It is here that the removal of organic materials begins. These tanks reduce the velocity of the flow, and allow the heavier organic matter to settle to the bottom.

It takes up to two hours for the wastewater to pass through these tanks. This retention period settles out about 60 per cent of the solids. The settled material, called "raw sludge", is drawn from the bottom of the tanks and delivered to the digesters for further treatment.

Surface scum is removed by a skimming mechanism and delivered to the digesters. The partially treated wastewater, now called the "primary effluent", flows out from the tanks over a weir into a collector channel. From here it flows into the next section of the plant for further treatment.

Aeration Section

The primary effluent flows into another set of tanks, called "aeration" tanks, where the finely-divided, suspended and collodial organic material remaining in the wastewater is oxidized by aerobic bacteria.

The aeration tanks retain the primary effluent long enough to allow the bacteria to assimilate (oxidize) most of the remaining organic matter. To do this the bacteria require an abundance of oxygen, which the wastewater does not normally have at this point. Air compressors are used to feed a steady stream of

air into the tanks to supply the needed oxygen. The air creates enough agitation in the tanks to prevent material from settling.

As bacteria assimilate the organic matter, a light sludge floc is formed which is the vehicle in and upon which the bacteria grow. This sludge floc is called "activated sludge".

Final Settling

The discharge from the aeration section flows into the final settling tanks and is retained for about three hours to allow the activated sludge to settle. This is then removed and pumped back into the aeration section to be mixed with the primary effluent. This transfer "seeds" the primary effluent and maintains the bacteriological process. Any unwanted activated sludge is transferred to the digesters.

At this point from 90 to 95 per cent of the solids contained in the raw wastewater have been removed. The settled water, called the "final effluent", flows out from the tanks over a weir into collector channels, which deliver it to the next stage.

Chlorination

In the chlorine contact chamber a chlorine solution is mixed with the final effluent to destroy any bacteria which may remain after treatment. An outfall sewer carries the disinfected effluent from this chamber to the watercourse.

At some water pollution control plants a nutrient removal stage has been incorporated. Nutrient removal is achieved by the addition of ferric chloride to the treatment process. This chemical reacts with phosphates in the sewage and forms as insoluble iron phosphate which also settles out in the clarifier and helps reduce the amount of phosphorus being discharged into the receiving waters.

Digestion

The raw sludge removed from the primary settling tanks, the surface scum and any excess activated sludge are delivered to the digesters for further treatment.

Sludge digestion at this point is carried out in two stages. In the first stage, primary digestion, anaerobic bacteria partially break down the sludge into various substances. The contents are constantly mixed to ensure overall treatment.

The second stage, secondary digestion, receives the partially digested sludges and completes the process. The contents are not agitated to encourage settling.

During the digestion process gas is produced, mainly methane, which is collected in the top of the digesters. This gas is used as a fuel for the plant boilers which heat the building and to maintain a constant temperature, of about 32°C within the digesters. Excess gas is burned off by a waste gas burner.

Vacuum Filtration

Due to the large quantities of sludge produced at some plants, the water content of the sludge is reduced to cut down the volume which must be trucked away to a disposal area.

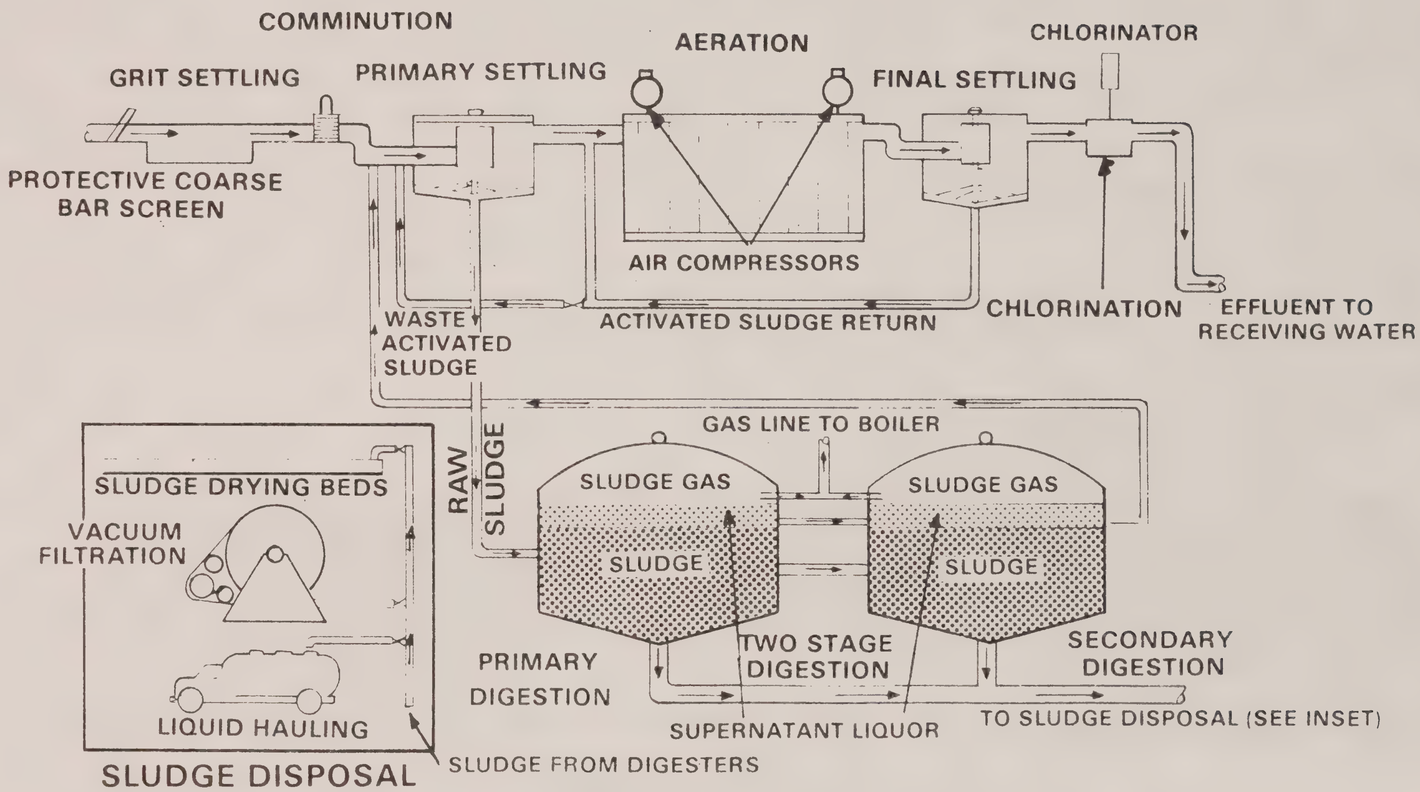
The de-watering is accomplished with vacuum filters. A large drum covered with closely spaced steel coils or a cloth blanket passes through a trough and picks up the chemically pre-conditioned digested sludge. A vacuum is created within the drum, and atmospheric pressure pushes water through the digested sludge to the drum, leaving a "sludge cake" on the surface. As the sludge cake is formed a scraper separates it from the surface, and it is dropped onto a conveyor and carried to a holding area.

Plant Operation

Water pollution control plants, staffed by specialists in the field of plant operation are located throughout Ontario. A visit to a local plant is suggested to see what is being done to control water pollution in your area.

* * * * *

WATER POLLUTION CONTROL PLANT FLOW DIAGRAM



Tour Notes and Observations

Glossary of Terms

AERATION: the supply of (compressed air or atmospheric) oxygen to wastewater in order to promote the growth and maintenance of bacteria.

AEROBIC: living in the presence of oxygen.

ANAEROBIC: living in the absence of oxygen.

BACTERIA: microscopic fungi which possess both animal and plant-like characteristics suggesting border-line organization between the true fungi (Chlorophyll-free plants) and the protozoa (one-celled animals). Where aerobic oxidation is involved, such as the aeration section of the activated sludge process, the process is known as respiration (aerobic). When the process takes place in the absence of molecular oxygen, such as in a digester, the process is termed fermentation (anaerobic).

DIGESTER: a specially designed brick or concrete structure, usually circular in shape, into which sludge is discharged for the purpose of providing a suitable environment for the action of bacterial fermentation.

EFFLUENT: liquid (water) flowing out.

GRIT: sand and other non-organic material which, if allowed to enter the treatment plant, accumulates in the digesters and could cause damage to plant equipment due to its abrasive characteristics.

INFLUENT: liquid (water) flowing in.

Additional information on the operation and maintenance of a water pollution control plant may be obtained from the superintendent of the Environment Ontario or municipally operated plant in your area.

(A schematic of a typical water pollution control plant is reproduced on page 3.)

FAITS

Ministère de l'Environnement

Ontario

l'hon. Keith C. Norton, c.r., Ministre

Gérard J. M. Raymond Sous-ministre

FONCTIONNEMENT D'UNE STATION D'ÉPURATION DES EAUX USÉES

WFS9

Avant-propos

Le Ministère de l'Environnement de l'Ontario est une agence gouvernementale qui s'occupe de la gestion des eaux dans l'Ontario.

L'approvisionnement en eau propre par le biais de la prévention de la pollution est dans l'une de ses tâches. Le rejet des eaux vannes des villes est une source de pollution importante. Les eaux vannes contiennent en moyenne une livre de matière solide pour 500 gallons de liquide. Une ville de 10,000 habitants peut rejeter jusqu'à 2,000 livres de solides chaque jour dans un lac ou une rivière par ses eaux vannes non traitées.

Il existe différentes méthodes de traitement des eaux vannes. La technique d'activation de la boue est la plus répandue dans les grandes zones urbaines. Une station d'épuration de ce type permet le traitement biologique complet, en filtrant de 90 à 95% des matières solides, ce qui donne un écoulement d'eaux usées de bonne qualité.

Système de collecteur

Les eaux vannes de la ville entrent dans la station d'épuration par des canalisations situées sous le bâtiment d'arrivée.

Elles passent d'abord dans des grilles et des broyeurs. Les grilles retiennent les objets de grande dimension qui pourraient endommager l'équipement. Les broyeurs hachent les gros objets en morceaux suffisamment petits pour être absorbés par l'unité de traitement suivante.

Dépôt des impuretés non organiques

A la sortie du broyeur, les eaux vannes s'écoulent dans un puits collecteur, d'où elles sont pompées dans l'unité de dépôt des impuretés adjacente au bâtiment qui abrite le système collecteur.

Dans l'unité de dépôt des impuretés, les eaux vannes reposent suffisamment longtemps pour permettre aux particules de sable et autres rejets solides de se déposer au fond du bassin. Si cette matière n'était pas enlevée, elle entraverait la marche de l'appareil de traitement des boues et pourrait abîmer la machinerie de l'unité de traitement suivante.

Périodiquement, le sable et les matières abrasives laissés par la décantation sont enlevés et jetés dans des fosses à déchets.

Première décantation

Du puits collecteur, les eaux vannes s'écoulent dans le premier bassin de décantation. C'est dans ce bassin que commence l'opération de décantation des matières organiques. Ces bassins ralentissent le flot, ce qui permet aux matières organiques de se déposer au fond. Les eaux usées prennent plus de 2 heures pour le traverser. A peu près 60% des matières solides se décantent pendant cette période de rétention. Le dépôt, que l'on appelle les boues, est soutiré du fond du bassin et vidé dans les appareils de traitement des boues.

Une machine capte l'écume en surface et l'envoie dans l'appareil de traitement. Les eaux vannes partiellement traitées, appelées après cette opération "l'effluent primaire", s'écoulent du bassin par dessus un barrage dans un canal collecteur qui les dirige vers une autre phase du traitement.

Bassins d'aération

L'effluent primaire passe dans un autre

jeu de bassins, appelés "bassins d'aération", dans lesquels les restes de matière organique en suspension sont oxydés par des bactéries qui se trouvent dans l'air.

Les bassins d'aération gardent l'effluent primaire suffisamment longtemps pour permettre aux bactéries d'assimiler (oxyder) la plus grande partie de la matière organique. Les bactéries, pour jouer leur rôle, ont besoin de beaucoup d'oxygène. Et généralement à ce stade du traitement les eaux vannes n'en contiennent plus assez. On utilise des compresseurs pour fournir de l'oxygène en quantité suffisante. L'air pulsé provoque des remous suffisants pour empêcher les particules de se décanter au fond du bassin.

Un léger précipité boueux se forme pendant que les bactéries assimilent les matières organiques. Ce précipité, appelé boue activée, est le véhicule qui permet la croissance des bactéries.

Décantation finale

Au sortir des bassins d'aération, le liquide s'écoule dans un dernier bassin de décantation, où on le laisse reposer pendant 3 heures pour permettre aux boues activées de se déposer. Puis le liquide est repompé dans les bassins d'aération pour être mélangé avec de l'effluent primaire.

Ce transfert ensemence l'effluent primaire et conserve le processus bactériologique. Les boues activées inutiles sont transférées dans l'appareil de traitement des boues.

A ce stade, 90 à 95% des matières solides contenues dans les eaux usées ont été enlevées. L'eau décantée, appelée "l'effluent final", coule dans un canal collecteur par dessus un barrage. Cette canalisation la dirige vers la prochaine phase.

Chloruration

Une solution de chlore est mélangée à l'effluent final afin de détruire les bactéries qui y restent après le traitement. Une canalisation déverse l'effluent désinfecté dans un cours d'eau. Dans certaines stations d'épuration, une phase intermédiaire a été incorporée pour enlever les substances nutritives. Pour ce faire, on ajoute du chlorure de fer pendant le traitement. Ce produit chimique réagit avec les phosphates dans les canalisations et forme un phosphate de fer insoluble qui se dépose. Cette technique permet de réduire la quantité de phosphate déversé dans les eaux d'accueil.

Traitement des boues

Les boues retirées du premier bassin de décantation, l'écume de surface et l'excédant de boues activées sont rejetées dans l'appareil de traitement.

Le traitement des boues s'effectue en deux temps. Dans un premier stade, au traitement primaire, des bactéries anaérobiques décomposent les boues en différentes substances. Les composants sont constamment mélangés pour assurer un traitement complet.

Le deuxième stade, ou traitement secondaire, reçoit les boues partiellement traitées et achève le processus. Les boues ne sont pas agitées pour favoriser la décantation.

Le processus de traitement des boues produit des gaz, essentiellement du méthane, qui sont récupérés dans la partie supérieure de l'appareil de traitement. Ces gaz servent à chauffer le bâtiment et à maintenir une température constante de près de 90° F, dans l'appareil. Des brûleurs consomment les gaz inutilisés.

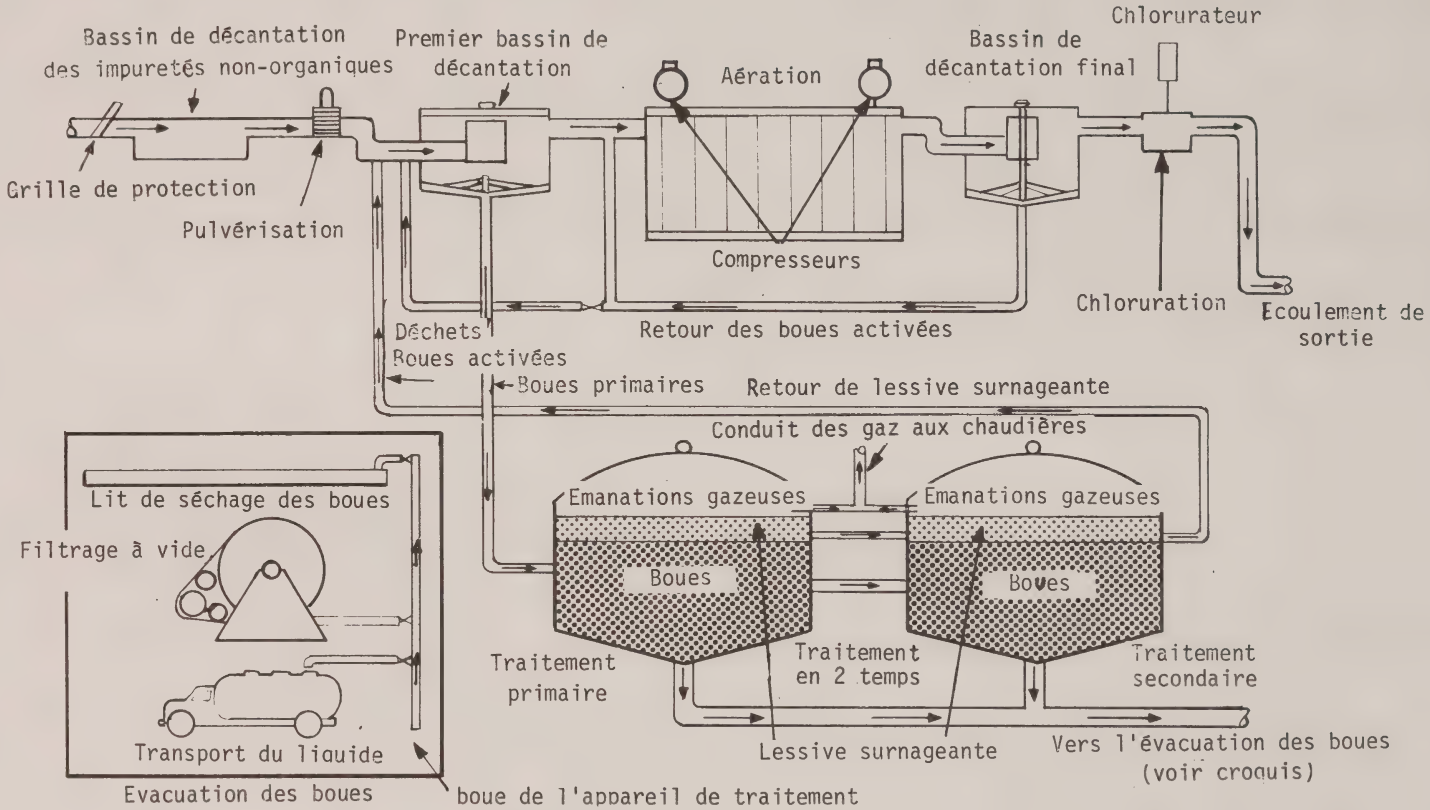
Filtration par dépression

Pour faciliter le transport de la boue, certaines stations d'épuration qui en rejettent de grandes quantités réduisent la liquidité des boues qui doivent être transportées par camion au dépôt des déchets.

On utilise à cet effet un filtre à dépression. Il s'agit d'un tonneau, couvert par un tamis en acier aux mailles serrées, ou par une pièce d'étoffe, qui passe à travers un bac et ramasse les boues prétraitées chimiquement. Un vide se forme dans le tonneau et la pression atmosphérique fait sortir l'eau de la boue dans le tonneau laissant un "gâteau de boue" à la surface. Quand le gâteau est formé, un grattoir le détache de la surface, et il tombe sur un convoyeur qui l'amène à une décharge.

FONCTIONNEMENT D'UNE STATION D'EPURATION

Diagramme de l'écoulement



Fonctionnement d'une station

Les stations de contrôle de la pollution des eaux emploient des spécialistes. Elles sont situées dans toute la Province. Nous vous en suggérons la visite; vous pourrez alors voir ce qui se fait en matière de contrôle de la pollution dans votre région.

* * * *

Remarques et Observations sur la visite

Glossaire des termes

AÉRATION: envoi (d'air comprimé ou atmosphérique) d'oxygène dans les eaux usées pour faciliter la croissance et la vie des bactéries.

AÉROBIQUE: qui vit dans un milieu oxygéné.

ANAÉROBIQUE: qui vit dans l'absence d'oxygène.

BACTÉRIE: champignon microscopique qui a des caractères végétaux et animaux; à la limite entre le vrai champignon (plante sans chlorophylle) et le protozoaire (animal uni-cellulaire). Dans le cas de l'oxydation aérobique, comme l'aération dans la méthode d'activation de la boue le processus est connu sous le nom de respiration. Si la méthode n'implique pas d'aération, comme dans l'appareil de traitement, le processus est connu sous le nom de fermentation.

APPAREIL DE TRAITEMENT DES BOUES: Structure fermée en brique ou en béton, généralement de forme circulaire, conçue pour créer un environnement favorable à la fermentation bactériologique.

EFFLUENT: liquide (eau) qui s'écoule à la sortie de la station.

IMPURETES: sable et autres matières non organiques, qui sont décantés en premier lieu. Ces matières sont retenues car elles pourraient endommager l'équipement en s'accumulant dans l'appareil de traitement des boues par leurs propriétés abrasives.

INFLUENT: liquide (eau) qui pénètre dans la station.

Des renseignements supplémentaires sur le fonctionnement et l'entretien des stations de traitement des eaux peuvent être obtenus auprès du superintendant de la station provinciale ou municipale de votre région.

12/76

(Un schéma d'une station d'épuration type est reproduit........ page 3)

FACTS

Ministry of the Environment

Ontario

Hon. Jim Bradley
Minister

Rod McLeod
Deputy Minister

Publication Code: AFS5

ABOUT PHYTOTOXICOLOGY

HOW AIR POLLUTION AFFECTS VEGETATION

Responses to air pollution can become manifest in various ways. Pollutants can injure vegetation, endanger human and animal health, soil buildings and clothing, contribute to highway accidents by reducing visibility, help depress property values and generally interfere with our aesthetic enjoyment of the landscape.

Vegetation injury due to air pollution is an area of particularly serious concern. It can range from visible markings on foliage to reduced growth and yield to premature death of plant life. The ensuing visual and economic consequences can at times be disastrous. Injury to crops possessing marketable foliage such as lettuce or tobacco can result in especially high losses.

Investigation of Vegetation Damage in Ontario

The Air Resources Branch of the Ministry of the Environment is responsible for the assessment of air quality and its effects to aid in the control and prevention of air pollution in Ontario.

The Phytotoxicolgy Section is responsible for determining the degree and extent of air pollution injury to all types of vegetation throughout Ontario. (Any pollutant that injures vegetation is a phytotoxicant.) The section pursues its objectives by:

1. Investigating requests from the public concerning suspected air pollution injury to vegetation -- forests, orchards, farm crops, ornamental plantings -- in both rural and urban areas. In so doing it is necessary to differentiate pollution injury from similar injuries caused by insects, disease, adverse weather, poor nutrition or mismanagement.

2. Conducting assessment studies in areas of concern where adverse effects on vegetation may occur as a result of emissions from existing or future sources of air pollution. If ambient air quality records coupled with vegetation data indicate the biological component of the environment to be in danger, then prompt abatement action is taken.

3. Carrying out practical research studies under controlled environment conditions on the effects of air pollutants on vegetation. These studies are conducted to complement field investigations, screen resistant plant species and determine air quality criteria for the protection of agriculture and forestry.

The staff of the Phytotoxicology Section consists of forest and plant pathologists, agricultural specialists, plant ecologists, a histopathologist, a biostatistician, and greenhouse and laboratory technicians. The Phytotoxicology laboratory is located in Brampton.

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In the Phytotoxicology laboratory, vegetation samples collected during complaint or assessment visits are examined by pathological and histological techniques, and processed for chemical analysis. A herbarium is maintained to demonstrate, compare, and diagnose plant material damaged by particular air pollutants.

Studies conducted in some areas include the growing of plants in specially designed shelters equipped or not equipped with devices to filter the ambient air. Certain plant species and varieties which are especially sensitive to various air pollutants are raised in a filtered-air greenhouse under uniform culture for use in field experiments.

The Environmental Protection Act, 1971, has made provision for a Board of Negotiation to mediate the settlement of claims of persons whose forests, crops, or livestock are damaged by air pollution and have suffered an economic loss.

Phytotoxicology personnel investigate over 200 air pollution vegetation complaints each year. Vegetation suspected of being injured by air pollutants included ornamental flowers, shrubs and trees; garden fruits and vegetables; stored vegetables; greenhouse flowers and crops; farm crops (white beans, tomatoes, green onions, winter wheat, oats and corn), animal pastures and cured hay; and fruit and forest trees.

Suspected air pollutants and those ascertained as causing vegetation injury included fluorides, sulphur dioxide, ozone, peroxyacetyl nitrate, boron, lead, chlorine, hydrogen chloride, arsenic, zinc, chromium, nickel, cobalt, salt spray, urea, nitrogen dioxide, ammonia, cement dust, magnesium-lime dust, and soot.

The Phytotoxicology Section maintains a close surveillance of vegetation in areas of concern throughout Ontario. Baseline studies are conducted in agricultural or forested areas before a major pollution source becomes operational to determine the pre-operational endemic conditions. Ecological studies keep the Section informed of increasing or decreasing vegetation effects in the vicinity of pollution sources.

Over 2,000 assessment station visits to areas of concern are made annually by Phytotoxicology personnel. During both public request and assessment investigations, over 10,000 soil and vegetation samples are collected each year for laboratory examination.

Effects of Air Pollutants on Plants

Air pollution injury to plants can be evident in various ways. Injury to foliage may become visible in a short time and take the form of necrotic lesions (dead tissue) or it can develop slowly and become manifest as a yellowing or chlorosis of the leaf. There may be a reduction in growth of various portions of a plant. Plants may be killed outright but they usually do not succumb until they have suffered injury perennially.

Injury may not be visible externally with effects occurring sub-cellularly in cell membranes and chloroplasts (plant organelles where photosynthesis takes place). The plants may suffer physiologically due to an upset in the rate of photosynthesis, respiration or transpiration.

Sulphur Dioxide

There is reference to the deleterious effects of sulphur dioxide on vegetation dating back more than 100 years in Europe. In the United States the Experiment Station of the Agricultural College of Utah published a bulletin in 1903 describing the effects of smelter smoke on Utah agriculture. In the 1930's an international problem arose when smelter fumes emitted by the Consolidated Mining and Smelting Company at Trail, British Columbia travelled down the Columbia River Valley to damage forests in Stevens County in the State of Washington. Comprehensive investigations were carried out for about 10 years resulting in the publication of a book by the National Research Council of Canada in 1939. Investigations in the Sudbury district of Ontario started in the 1940's and are still continuing.

Major sources of sulphur dioxide are coal burning operations, especially those providing electric power and space heating. Large quantities of sulphur dioxide can also result from the burning of petroleum fuels and the smelting of sulphur-containing ores.

Sulphur dioxide enters leaves mainly through the stomata (microscopic openings where normal gas exchanges of oxygen and carbon dioxide occur). The toxicity of sulphur dioxide to the mesophyll cells (inner chloroplast-containing cells) of leaves is primarily due to its reducing properties.

Leaf injury is classified as either acute or chronic. Acute injury is caused by absorption of high concentrations of sulphur dioxide in a relatively short time. This results in a rapid accumulation of sulphite which is toxic to the metabolic processes taking place in the mesophyll cells.

Chronic injury is caused by long-term absorption of sulphur dioxide at sub-lethal concentrations. The sulphite formed is oxidized to sulphate at about the same rate that the gas is absorbed. When sulphate accumulates beyond a threshold value that the plant cells can tolerate, chronic injury occurs. It is estimated that sulphate is about 30 times less toxic than sulphite.

Acute sulphur dioxide injury on broad leaves takes the form of bifacial lesions, which usually occur between veins, and is often more prominent towards the petiole (leaf-stalk). The injury is local. The metabolic processes are completely disrupted in the necrotic or dead areas, with the surrounding leaf tissue remaining green and functional. The green pigments are decomposed and the affected leaf area assumes a bleached, ivory, tan, orange-red, reddish-brown or brown appearance, depending upon the plant species, time of year and weather conditions. The tissue on either side of the veins is extremely resistant. In some cases, injury can occur on the margins of leaves.

Young leaves rarely display necrotic markings whereas newly expanded leaves are most sensitive to sulphur-dioxide injury. The oldest leaves are moderately sensitive. In monocotyledonous (blade-like) leaves the injury can occur at the tips and in lengthwise areas between the main veins. In conifers acute injury usually appears as a bright orange-red tip necrosis on current-year needles, often with a sharp line of demarcation between the injured tips and the normally green bases. Occasionally the injury may occur in bands, in apical, medial or basal locations on the needles.

Chronic sulphur-dioxide injury becomes manifest as a yellowing or chlorosis of the leaf, sometimes from lower to upper surfaces on broad leaves. Occasionally only a bronzing or silvering will occur on the undersurface of the leaves. The rate of metabolism is reduced in leaves displaying chronic injury. In conifers chronic injury on older needles is first indicated by a yellowish-green colour that changed to reddish-brown starting at the tips and developing basipetally (toward the base).

Different plant species and varieties and even individuals of the same species may vary considerably in their sensitivity or tolerance to sulphur dioxide. Susceptibility lists have been made by several investigators but they can be only used as a guide. Variations can occur because of differences in geographical location, climate, and plant stage of growth and maturation.

Vegetation sensitive to sulphur dioxide include alfalfa, barley, eastern white pine, white birch, white ash, trembling aspen, Chinese elm, Manitoba maple and Braken fern.

In cities, trees found resistant to sulphur dioxide pollution in descending order are Ailanthus, pin oak, gingko, Carolina poplar, London plane, Norway maple and little-leaf linden.

Environmental factors conducive to optimum plant growth usually abet sulphur-dioxide injury. They include sunlight, moderate temperature, high relative humidity, wind and adequate soil moisture.

Most investigators have shown a direct relationship between open stomata and the absorption of sulphur dioxide and subsequent leaf injury. When stomata are closed, either at night because of darkness or during the day because of other factors, plants are more resistant to sulphur dioxide. It has been reported that the potato plant is as equally sensitive at night or during the day because their stomata do not close at night.

Vegetation is most susceptible to sulphur dioxide during the active growth months of June, July and August. For acute foliar injury to occur, 0.25 parts per million (ppm) of sulphur dioxide for eight hours or 0.95 ppm for one hour usually must be present. If the environmental factors and growth stages of the plants are not conducive to injury, the plants will escape injury even in the presence of potentially damaging concentrations of sulphur dioxide.

Fluorides

Fluoride injury to vegetation was recognized in Germany over 70 years ago. In addition to vegetation damage, livestock was affected in the vicinity of certain industries.

Fluorides may be discharged into the atmosphere from the combustion of coal; the production of brick, tile, enamel frit ceramics, and glass; the manufacture of aluminum and steel; and the production of hydrofluoric acid, phosphate chemicals and fertilizers.

Plants may be injured when exposed for several weeks to atmospheric concentrations of fluoride of less than 1 part per billion (ppb). Similar injury symptoms may be produced by higher concentrations for shorter periods of time. The amount of fluoride accumulated in plant tissues depends on the absorption capacity of the plant, its sensitivity to fluorine and ambient air concentrations. High concentrations of fluoride may accumulate in leaves during the growing season while subjected to extremely low concentrations in the air. Bitternut hickory can concentrate up to 1,000 ppm fluoride in its leaves without showing any visible injury, whereas the sensitive gladiolus may exhibit leaf injury with less than 35 ppm fluoride.

Fluorides absorbed by leaves are translocated towards the margins of broad leaves and to the tips of monocotyledonous leaves and coniferous needles. Little injury takes place at the sites of absorption, whereas the margins or tips of the leaves build up lethal concentrations, resulting in necrosis. The rates of translocation and concentration of fluoride are of primary importance with regard to explaining injury to sensitive plants.

Fluoride injury starts as a gray or light-green water-soaked lesion which turns tan to reddish-brown. It can appear within a few hours of a week after exposure depending on plant species and variety, the concentration of atmospheric fluorides, the duration of exposure and various environmental conditions. With continued exposure, the necrotic areas increase in size spreading inward to the mid-rib on broad leaves and downward on coniferous needles.

Fluorides inhibit photosynthesis, the impairment being measurable even before visible leaf injury occurs. With continued fumigation, the decrease in photosynthesis rate parallels the increase in leaf tissue necrosis. Fluorides inhibit enzymes in vitro. A well-known example is enolase, an enzyme required in the glycolytic pathway of plant respiration.

Studies of plant species susceptibility to fluorides showed that pine (developing needles), gladiolus, apricot, prune, plum, grape, tulip, iris, St. Johnwort and sweet corn were most sensitive.

Atmospheric fluorides, by concentrating in foliage and directly injuring plants, pose a threat to the health of livestock. Forage crops may appear normal while actually containing high concentrations of fluroide. Alfalfa, for example, can tolerate several hundred ppm fluoride without showing visible injury. Cattle, feeding on this plant over an extended period of time, may develop the disease fluorosis if the fluoride content is in excess of 40 ppm. The symptoms of chronic fluorine toxicosis are mottled and abraded teeth, swollen periosteal (bone surface) tissue, lameness and, in severe cases, decreased appetite and milk production.

Ozone and PAN

Ozone and PAN (peroxyacetyl nitrate) are the main phytotoxicants in the Los Angeles type of oxidant smog now plaguing many urban areas. Automobile exhaust is the major contributor of the primary pollutants (nitrogen oxides and reactive hydrocarbons) in the photochemical reaction producing the secondary toxic pollutants (ozone and PAN).

Oxidant damage to plants was first observed in the Los Angeles area in 1944. A wide variety of plants are susceptible to oxidant damage. Ozone causes a spotting, bleaching or chlorosis of upper leaf surfaces. PAN causes bronzing, silvering, or glazing of lower leaf surfaces. Typical lesions are produced on tabocco plants by concentration of ozone as low as 0.05 ppm for four hours. Sensitive plants, such as tomato and lettuce have been injured by 15 to 20 ppb of PAN in a four hour exposure. Light is necessary before, during and after a fumigation by PAN to cause visible injury. In southwestern Ontario, phytotoxicology surveys conducted annually have revealed the widespread occurrence of ozone injury on tobacco and white bean crops and PAN-type injury on tomato crops.

Susceptibility to ozone injury is influenced by environmental and plant factors. It is increased by high relative humidity and low carbohydrate content. Ozone injury to broad leaves displays a definite pattern related to the development of functional stomata. The youngest leaves are resistant and with expansion become susceptible at their tips. With increasing maturity the leaves become successively susceptible at middle and basal portions. The leaves become resistant again at complete maturation. Peculiarly, ozone usually enters through the stomata on lower leaf surfaces but injures palisade mesophyll cells in the upper layers of the leaf. In these cells the chloroplasts disintegrate followed by plamolysis (contraction) and desiccation (drying up) of the cellular contents.

In addition to visible injury, growth suppression may result from the effects of oxidants decreasing photosynthesis and changing cell membrane permeability.

Recent work has shown that sulphur dioxide and ozone may act synergistically in an air pollution mass to reduce the required concentrations of either gas to produce leaf injury. Ozone as low as 0.027 ppm when combined with 0.24 ppm sulphur dioxide injured Bel W3 tobacco plants in two hours.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) in high concentrations can cause plant injury symptoms similar to those caused by sulphur dioxide. Under high light intensities, about 6.0 ppm of NO_2 for two hours is required to injure sensitive plant species, such as pinto bean, tomato, and cucumber. Low light intensity increases sensitivity of plants with injury developing after exposure to 2.5 - 3.0 ppm of NO_2 for two hours. Nitrogen dioxide can injure the same plants as ozone and in the same physiological tissue. Injury symptons are different, however, and approximately 10 times as much niutrogen dioxide is required. Long-term exposures of tomato plants to low concentrations of nitrogen dioxide (up to 0.5 ppm for 10 to 22 days) may inhibit plant growth, and increase the green color (chlorophyll content) of the leaves. Experimental work has shown that low levels of NO_2 (0.10 ppm) in combination with SO_2 (0.10 ppm) acted synergistically injuring a number of plant species in a 4 hour exposure period.

Chlorine

Chlorine is not widespread in the atmosphere. It is usually confined to the immediate area surrounding its source. High concentrations of chlorine released in tank car accidents can cause severe defoliation and leaf injury to contiguous vegetation. The symptoms of chlorine injury are quite diverse, and range from terminal and marginal necrosis and chlorosis, to interveinal lesions occuring both bifacially and on upper leaf surfaces only.

Alfalfa and radish plants are injured by 0.1 ppm of chlorine for two hours. This threshold dosage places chlorine between fluorides and sulphur dioxide in phytotoxicity.

Particulate Matter

Particulate matter such as cement dust, magnesium-lime dust and carbon soot deposited on vegetation inhibit photosynthesis. Cement dust may cause chlorosis and death of leaf tissue by the combination of a thick crust and alkaline toxicity produced in wet weather. Deciduous and coniferous trees are injured, the latter occasionally killed. Accumulation of alkaline dusts in soil can increase soil pH to levels adverse to crop growth. Sulphuric acid aerosols produce punctate spots on the upper surfaces of wet leaves.

De-icing compounds applied to roads and highways in winter can result in injury to roadside vegetation caused by splashing of the salt by passing vehicles. Fruit trees such as peach and apple are particularly susceptible to salt spray. The severity of twig dieback injury on the trees decreases with distance from the road and becomes negligible usually beyond 150 feet.

Investigating Air Pollution Injury to Vegetation

Any resident of Ontario who suspects that plant life (ornamentals, crops, orchards or woodlands) is being affected by air pollution can request an investigation by the Phytotoxicolgy Section. If the injury is diagnosed as being caused by air pollution and the source is detected, a report of the investigation is sent to both the complainant and the offending source. Abatement engineers are notified to inspect the offending source to prevent further phytotoxic emissions.

The Air Resources Branch encourages private settlement of damages. If this is not feasible, the claimant can request mediation by the three-man Board of Negotiation.

The investigation of an air pollution vegetation complaint at times may be compared to a "Whodunit". Research experience and the application of detective work to plant pathology techniques are essential. Some complaints are solved readily; others require lengthy investigations.

One complainant property was surrounded by seven industries. The local Abatement engineer wanted to know what pollutant caused the vegetation injury and which industry was responsible. Through careful investigation of the pattern of injury on both complainant and neighbouring properties, through the knowledge of air pollution injury symptoms and the susceptibility and resistance of various plant species, by examining wind records and by chemically analyzing collected vegetation, it was found that the injury was caused by an acute fumigation of sulphur dioxide and that the source was a sulphite pulp and paper mill. Not only were the complainant and the offending source brought together for settlement of damages, but the industry also purchased new control devices to prevent any further accidental release of high concentrations of sulphur dioxide.

In another investigation of an acute episode, the vegetation injury area was situated between two industries -- an aluminum chloride manufacturer about one mile west and a nickel refinery about one mile southwest. Phytotoxicology personnel made a detailed vegetation survey in the area. No pollution injury was observed near the industry to the west or at locations midway between the injury area and this industry. In the injury area, it was found that trees, shrubs and hedges displayed severe foliar injuries only on their southwest sides. Samples of collected foliage and soil were analyzed for several pollutants that the two industries could emit, such as sulphur, fluoride, chloride, aluminum, copper and nickel. The results showed that sulphur and fluoride contents were normal when compared to control collection analyses, that chloride, aluminum, and copper levels were slightly elevated, whereas nickel contents were present in excessive and toxic quantities. Since nickel was one of the pollutants emitted from the industry to the southwest, this industry was implicated as the offending source.

About 50 per cent of the injuries investigated by the Phytotoxicology Section are found to be due to other causal agents. For example, several complaints were received by the Phytotoxicology Section concerning injury to European mountain ash trees in Cornwall. Upon investigation, it was found that some of the injuries had indeed been due to air pollutants from local sources, but that for the most part the injuries were caused by the disease Cytospora canker which was rampant in the area at the time.

In North Bay, a number of complaints were received regarding heavy particulate fallout assumed to be originating from the new superstack at Sudbury 80 miles away. The phytotoxicology investigation showed that the particulate matter was organic in nature and occurred only near white birch trees. The particulate matter was diagnosed as droppings excreted by an insect, the birch skeletonizer, which was heavily infesting white birch trees throughout northern Ontario.

In Sarnia, residents complained in the spring that their houses had been splattered by "purple rain". Samples of the purple spots on paper and some debris collected from the area were examined in the Phytotoxicology laboratory. The spots were found to be caused by a purple pigment which had leached out of specks in the debris, and under the microscope the specks were identified as anthers from white elm flowers. Apparently a rainstorm had dislodged the anthers from the flowers on white elm trees and splattered them on the sides of houses causing the purple spots.

In early June of a recent growing season several complaints were received from the Port Maitland area that maple trees had suddenly developed leaf injuries on the sides of the trees facing a sulphuric acid making plant. A comprehensive investigation was carried out and it was found that this particular leaf scorch was widespread throughout the Niagara peninsula area of Southern Ontario. Chemical analyses, air sampling records, and other studies showed that air pollutants were not responsible for the injuries. Only succulent foliage on silver maple, sugar maple, red maple, and beech trees were found to display the injury symptoms which appeared suddenly in response to weather changes in which a wet, cloudy period was followed suddenly by a sunny, windy period. This abnormality has been named Late-Spring Leaf Scorch (LSLS).

These cases illustrate how other casual agents can injure vegetation creating symptoms that mimic those brought on by air pollution. When it is determined that injury is being caused by a biological agent or by poor management, the grower is advised to seek combative measures or management advice from the agency authorized to handle such matters.

Prevention of Phytotoxic Effects

The protection of plants from the adverse effects of aerial phytotoxicants cannot be carried out in exactly the same manner as is possible with disease-causing, organic reproductive bodies. A pollution-diseased plant cannot infect another plant; thus there is no need for a quarantine or for eradication of the affected plants. In certain instances, sprays and dusts have protected plants from air pollution injury. The development of resistant varieties holds some promise. The best control method, however, is to reduce the concentrations of noxious pollutants at their sources so as not to exceed the established air quality criteria for agriculture and forestry.

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Revised June 1981

FACTS

Ministry of the Environment
Ontario

Hon. Jim Bradley
Minister

Rod McLeod, Q.C.
Deputy Minister

SCIENTIFIC CRITERIA DOCUMENT FOR STANDARD DEVELOPMENT - POLYCHLORINATED DIBENZO-p-DIOXINS (PCDDS) AND POLYCHLORINATED DIBENZOFURANS (PCDFS)

BACKGROUND

A Ministry of the Environment staff committee was formed to develop the scientific basis for developing multi-media environmental standards. Medical advice was provided by the Ministry of Labour.

The Ontario Scientific Advisory Committee on Dioxins and Furans (OSAC) was appointed to provide technical direction and peer review. The Committee was comprised of world-renowned experts:

- Dr. E. Y. Spencer from the University of Western Ontario chaired the Committee
- Dr. O. Hutzinger, University of Bayreuth, Germany
- Dr. G. L. Plaa, University de Montreal
- Dr. S. Safe, Texas A and M University.

The culmination was the production of the Scientific Criteria Document comprising 536 pages reviewing:

- toxicology of this group of compounds
- their sources
- possible exposure pathways in Ontario.

MAJOR CONCLUSIONS AND RECOMMENDATIONS

What are PCDDs and PCDFs

The terms dioxin and furans refer to families of 75 related chemical compounds known as polychlorinated dibenzo-p-dioxins (PCDDs) and 135 related chemical compounds known as polychlorinated dibenzofurans (PCDFs) respectively.

These two families of compounds possess similar chemical structures, patterns of toxic and biological responses and may share a common mechanism of action at the cellular level. Therefore, they are being dealt with as a group for the purposes of development of environmental standards.

The most toxic forms of PCDDs and PCDFs are those containing 4-6 chlorine atoms, with four of the chlorine atoms at the lateral positions, i.e., 2, 3, 7 and 8.

The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) is the most toxic of all the PCDDs and PCDFs.

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These compounds are not intentionally made for any purpose; they are unavoidable by-products created in the manufacture of other chemicals such as some pesticides, or as a result of incomplete combustion of mixtures containing chlorine atoms and organic compounds.

Occurrence in Ontario

In Ontario, there is no current chemical manufacturing of 2,4,5-trichlorophenol, nor formulation of 2,4,5-T and 2,4-D herbicides or pentachlorophenol or hexachlorophenol chemicals with which PCDD and PCDF contamination has been associated.

Current sources of PCDDs and PCDFs in the Ontario environment are from incineration processes or the use of products which contain trace amounts of PCDDs and PCDFs.

The PCDDs and PCDFs from these sources are usually complex mixtures. The 2,3,7,8-T_4CDD isomer is generally only a small per cent of the total PCDDs and PCDFs present. This is in contrast to the problem in the United States where because of extensive chemical manufacturing and waste disposal, 2,3,7,8-T_4CDD is a serious environmental contaminant.

Analyses carried out by Health and Welfare Canada on PCDD and PCDF residues in tissues of deceased and living persons, indicate body burdens of some PCDD and PCDF isomers in the majority of the samples analyzed. These results suggest that PCDDs and PCDFs are ubiquitous at low levels in the Ontario environment.

Based on extensive reviews of the literature on the toxicology of PCDDs and PCDFs, the following conclusions and recommendations have been reached:

(a) Sources and Exposure
The document reviews extensively the current sources of PCDDs and PCDFs in Ontario based firstly upon analytical data from Ontario and where this is absent, upon extrapolation from other Canadian or international data. In order of decreasing contribution to the Ontario environment, the sources have been identified as:

i) combustion sources including municipal refuse and sewage sludge incineration;

ii) use of chemical products such as chlorinated phenols; and,

iii) other sources such as transboundary water and air contamination, chemical wastes, commercial and domestic wastes, polychlorinated biphenyls (PCBs) and sewage.

Based on preliminary exposure assessment the major routes of exposure in order of decreasing contribution appear to be;

i) ambient air in the vicinity of incineration sources;

ii) diet, mainly some sport fish from Lake Ontario;

iii) atmospheric PCDDs/PCDFs deposited on soil, mainly to children; and,

iv) surface water - it should be noted that no PCCDs or PCDFs have been found in samples of finished drinking water in Ontario.

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(b) PCDD and PCDF Toxic Equivalent Factors

The report recommends the use of numerical conversion factors to convert the toxic concentrations of other PCDD and PCDF congeners to equivalent concentrations of 2,3,7,8-T_4CDD which would exhibit similar toxicity.

2,3,7,8-T_4CDD comprises a very small percentage of PCDD and PCDF isomers found in Ontario environmental samples.

Ontario environmental samples contain complex mixtures of PCDD and PCDF isomers.

There is only sufficient toxicological data for 2,3,7,8-T_4CDD (the most toxic and most studied isomer) for standard development.

The time required to accumulate suitable toxicological data on other isomers may run into decades. The apparent toxic potency relationships of other PCDDs and PCDFs to 2,3,7,8-T_4CDD is proposed.

(c) Recommended Maximum Allowable Daily Intake

Review of extensive toxicological data indicates that 2,3,7,8-T_4CDD is not a classical mutagen and appears to cause tumours in rodents by an indirect mechanism. The staff committee and the Ontario Scientific Advisory Committee concluded that a threshold exists for tumour incidence and consequently 2,3,7,8-T_4CDD will not cause cancer in humans at levels below the threshold found in animal studies.

Based on reliable chronic animal studies and extensive but inconclusive human epidemiological data, it is recommended that a threshold-safety factor approach be used to develop a maximum allowable daily intake.

The proposed standard recommends an umbrella maximum allowable daily intake of 2,3,7,8-T_4CDD or its toxic equivalent from all exposure pathways based on no observable effect level from rodent cancer bioassays and an explicit safety factor of 100.

The recommended maximum allowable daily intake for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) or its toxic equivalent of PCDDs and PCDFs is 10 picograms/kilogram of body weight/day for humans.

Copies of the document are available from:

Intergovernmental Relations
and Hazardous Contaminants Branch
Ministry of the Environment
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FACTS

Ontario

Ministry of the Environment

Hon. Jim Bradley
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ONTARIO MINISTRY OF THE ENVIRONMENT
ACHIEVEMENTS AND FUTURE DIRECTIONS IN GREAT LAKES
CLEAN-UP AND DRINKING WATER PROTECTION

INTRODUCTION

The Great Lakes are vital to the citizens of Ontario and are an important resource to all of Canada. More than six million Canadians live in the Great Lakes basin. Add this to the U.S. population in the basin, and there are nearly 37 million people dependent on this waterway as a major source of water supply, employment and recreation.

Recognizing their shared responsibility in the use and protection of the lakes, Canada and the United States created the International Joint Commission in 1909. Between 1912 and 1969, the IJC conducted several studies of Great Lakes pollution leading to the signing of the Great Lakes Water Quality Agreement of 1972. This marked the beginning of a major international clean-up of Lakes Erie and Ontario, the initiation of studies on pollution from land use activities and the introduction of new initiatives in toxic substances management.

Ontario has long been at the forefront in the assault on Great Lakes pollution and in the development and protection of drinking water supplies. Since 1972, the Ministry of the Environment and, for 15 years prior to that, the Ontario Water Resources Commission have been instrumental in the funding, construction and operation of water and sewage treatment facilities, in the introduction and enforcement of environmental regulations, in the continued development and refinement of water quality objectives and in the assessment and resolution of water use conflict.

WATER QUALITY AND QUANTITY MANAGEMENT

The water quality management goal of the Ministry of the Environment is: "To ensure that the surface waters of the Province are of a quality which is satisfactory for aquatic life and recreation". The Provincial Water Quality Objectives (PWQO), a set of criteria designed to protect these uses, are published in the booklet "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment". The Ministry achieves this goal through programs and actions provided for in the Ontario Water Resources Act, the Environmental Protection Act and other legislation. Ministry approval of waste discharges and of treatment works is required under these statutes.

On the water quantity side, the Ministry of the Environment goals are directed toward the fair sharing of the available supply to protect both withdrawal and in-place uses of surface water, and to ensure a fair sharing and conservation of ground water.

The permit to take water program, authorized under Ontario Water Resources Act, is the primary water quantity management tool employed by the Ministry of the Environment. All water users withdrawing or impounding over 50,000 litres on any one day of the year are required to obtain a Permit. There are currently approximately 6000 Permits in force authorizing the withdrawal or impoundment of 14.4 billion litres per day.

The Provincial Water Quality Objectives ensure protection of other uses including potable water supplies. Drinking water quality is further protected through requirements for additional purification and disinfection of these supplies prior to delivery to the consumer.

CONTROLLING MUNICIPAL SEWAGE

PROGRAMS:

With the creation of the OWRC in 1956, Ontario launched a massive program to provide basic sewage services throughout the province. The program has continued under the direction of the Ministry of the Environment since 1972 and construction of new plants in Ontario is now virtually complete. Provision of these facilities has been instrumental in protecting the public from the outbreak of waterborne disease. Minor plant upgrading is ongoing and emphasis has switched to ensure existing plants meet Ministry effluent requirements through good operations and maintenance.

There are presently 308 sewage treatment plants in the Ontario portion of the Great Lakes Basin. With an approximate capacity of 5.2 million cubic metres per day these facilities serve 6.4 million people. This represents a 36% increase from the 4.7 million people serviced in 1970. Secondary treatment or better is now provided at 283 plants serving 88% of the total capacity. Fifteen years ago, only 77% of plant capacity received this level of treatment. Phosphorus removal facilities are installed at 230 plants representing 97% of the overall capacity. Total phosphorus inputs from Ontario plants have been reduced by 77% or 5400 tonnes since 1970. This constitutes a major step in the battle against the nutrient enrichment problem and resultant algal "blooms" which had plagued Lakes Erie and Ontario.

The total investment in the construction of municipal sewage collection and treatment facilities in Ontario has been in excess of $3.3 billion since 1968. Of this an estimated 80% or $2.7 billion was devoted to the Great Lakes Basin.

MUNICIPAL PHOSPHORUS LOADING REDUCTIONS

	1968	1983	Change
POPULATION SERVED	4.7 Million	6.4 Million	+36%
PHOSPHORUS LOAD TONNES/YR	7000	1600	-77%
AVERAGE EFFLUENT CONCENTRATION MG/L	6	1.0	-83%

ENVIRONMENTAL IMPROVEMENTS:

Accomplishments over the past 15 years in upgrading sewage treatment facilities throughout the Great Lakes basin have resulted in significant environmental improvements.
Recent investigations by the Ministry and other agencies show that:

- Shoreline bacterial levels adjacent to Ontario towns and cities around the Great Lakes are greatly reduced from levels observed in the 60's and in most cases comply with objectives.

- The median total phosphorus concentration in open waters of Lake Ontario has declined to 13.5 ug/L, the lowest reported in the last 13 years. Improvements are also reflected in nearshore areas such as Hamilton Harbour, Toronto Harbour and Bay of Quinte where phosphorus levels have declined by up to 50% over the same period.

- Improving conditions in Lake Ontario are also indicated by a shift toward healthier (less enriched) phytoplankton (algae) species composition.

- Measurable reductions in oxygen depletion problems have taken place in Toronto and Hamilton harbours and in the Bay of Quinte.

- Local water treatment plant efficiencies have improved because of reduced algal growth in the Bay of Quinte.

- Total phosphorus concentrations have declined 35% in western Lake Erie since 1974.

- Nuisance growths and shoreline accumulation of cladophora (algae) in eastern Lake Erie are down significantly.

- There is some evidence of a reduction in the severity of oxygen depletion in the deep portions of the central basin of Lake Erie.

- In Lake Huron and Georgian Bay, the total phosphorus concentrations (5 ug/L) have remained unchanged since 1971. Thus, the non-degradation objective of the 1978 Great Lakes Water Quality Agreement is being met. Phosphorus levels in some embayment areas of Georgian Bay remain higher than open water levels due to nearby municipal inputs and limited exchange with the open water. They have, however, been stable since 1973.

- In Lake Superior, the average total phosphorus level has stayed around 5 ug/L, providing a high level of protection against aesthetic deterioration and satisfying the non-degradation objective.

CONTROLLING INDUSTRIAL POLLUTION

PROGRAMS:

MOE initiatives have demonstrated that environmental improvement and industrial progress can be compatible. Significant reductions in waste discharges have occurred over the past fifteen years in spite of overall production increases by industry and recurring recessionary factors in the economy. This has been achieved through the construction of treatment facilities, through process changes and through replacement of older industrial production facilities with new "environmentally clean" plants incorporating the latest water recycling, material conservation and energy saving measures. Following are highlights of achievements made by three major industrial sectors from 1967 to 1981/82, at an estimated pollution control expenditure of $500 million. Similar overall progress and expenditures have been made in the other industrial sectors such as petrochemical, metal finishing and fabrication, and food processing.

PETROLEUM REFINERIES

Over the past 15 years, two new refineries have been constructed (start-up in 1977) incorporating state-of-the-art environmental controls, two older refineries have closed, and the other refineries have installed secondary (biological), and in some cases tertiary (carbon filtration) wastewater treatment systems. Together, these activities have resulted in large reductions in the discharges of oxygen demanding wastes, suspended solids, oil and grease, phenolics and ammonia even though production capacity has risen significantly over the period.

PETROLEUM REFINERIES

	1967	1981	Change
NUMBER OF REFINERIES	7	8	+ 1
PRODUCTION 1000 BBLS/DAY	403	633	+ 57%
SUSPENDED SOLIDS KG/DAY	13300 (1972-73)	2170	- 84%
OIL & GREASE KG/DAY	4100	514	- 88%
AMMONIA - N KG/DAY	2320	313	- 87%
PHENOLICS KG/DAY	102	10.2	- 90%

STEEL

There are 3 primary steel producers in Ontario, two in Hamilton and one at Sault Ste Marie. Process improvements, better water management practices and waste treatment facilities have brought about significant reductions in the discharge of suspended solids, oil and grease, ammonia, phenolics and cyanide. The Ministry is requiring additional improvements to be made with programs at the Sault mill to be completed by 1990.

STEEL

	1967	1982	Change
NUMBER OF MILLS	3	3	
PRODUCTION TONNES/YR	8 Million	10.7 Million	+ 34%
SUSPENDED SOLIDS KG/DAY	126000	35500	- 72%
AMMONIA - N KG/DAY	23880	8280	- 65%
OIL & GREASE KG/DAY	30000	3380	- 89%
PHENOLICS KG/DAY	2730	358	- 87%
CYANIDE KG/DAY	2370	338	- 86%

PULP AND PAPER

Substantial decreases in loadings of oxygen-demanding substances and suspended solids, along with reduced effluent toxicity to fish, have resulted from a combination of mill modernization, better water management practices, process changes and installation of waste treatment facilities. Existing MOE control orders require further improvements to achieve compliance with the Federal Pulp and Paper Effluent Regulations by 1987.

PULP AND PAPER

	1967	1982	Change
NUMBER OF MILLS	22	22	
PRODUCTION TONNES/DAY	7350	8540	+ 16%
BOD_5* TONNES/DAY	610	315	- 48%
SUSPENDED SOLIDS TONNES/DAY	375	82	- 78%

*a measure of oxygen - demanding substances

ENVIRONMENTAL IMPROVEMENTS:

Achievements in reducing waste loads from these and other industrial sources along with controls on the manufacture and use of a number of chemical compounds in both Ontario and the Great Lakes States have resulted in corresponding improvements in the Great Lakes environment. Notable among the changes observed by the Ministry and others are:

- Declining levels of PCB's in sport fish from Lake Ontario, Lake Erie, Lake Huron, Georgian Bay and Lake Superior

- Declining inputs of PCBs, mirex, DDT, chlorinated benzenes and mercury from the Niagara River to Lake Ontario since the mid 1970's as evidenced by sediment and fish data

- Significant reductions in levels of phenolics, bacteria and phosphorus in the Niagara River

- Improvements in species diversity and numbers of bottom dwelling organisms which are important to the fish community along the Ontario shoreline of both the St. Clair and Detroit Rivers as well as in the western basin of Lake Erie

- Achievement of the water quality objective for phenolic substances and overall reduction in the zone of influence of petroleum refinery and petrochemical plant discharges on the St. Clair River

- Elimination or reduction of aesthetic degradation, i.e. oil films, discoloration, and floating solids, adjacent to industrial plants

- Reductions in mercury concentrations in fish to levels where commercial catches were resumed in the western basin of Lake Erie in 1975 and for certain species from Lake St. Clair in 1980

- Declining phenol, cyanide and ammonia levels in the St. Marys River

- Reductions in the zone of influence on water, sediment and biota of pulp mill discharges at all mill locations on Lake Superior

DRINKING WATER SUPPLY AND PROTECTION

As a result of major program initiatives by the OWRC and MOE most of the population in the Ontario Great Lakes basin is now served by communal water treatment and supply systems. Extension of service to the few remaining serviceable communities is continuing. Emphasis has, therefore, shifted to the optimization of existing plant operations and the upgrading of sub-standard facilities.

All water supply systems in Ontario are required to have acceptable treatment processes which ensure that the potable water produced meets the intent and limits set out in the Ontario Drinking Water Objectives. For water works which utilize surface water as a source of raw water, the standard treatment processes consist of chemical coagulation-flocculation, filtration and disinfection. For water works which utilize ground water, the standard treatment consists of disinfection.

There are presently 428 water treatment plants in the basin with an approximate capacity of 9.1 million cubic metres per day, sufficient to serve a population of 7.4 million people. Eighty-eight percent of the population obtain their drinking water from surface water supplies. Total investment in the construction of municipal water treatment and distribution facilities in Ontario has been in excess of $1.5 billion since 1968. Of this, an estimated 80% or $1.2 billion was directed to Great Lakes basin communities.

Beyond these statistics, the real benefits of the provincial water supply and treatment initiatives have been maximum public protection from the transmission of waterborne disease and the assured availability of a high quality supply to meet all household and community needs.

FUTURE DIRECTIONS

The large scale programs of the 60s and 70s for basic water and sewage service to serviceable communities in Ontario are now virtually complete. Substantial progress has also been made in reducing conventional pollutant loadings to the Great Lakes from industry. While these major activities are winding down, heightened public awareness and concern about potentially hazardous contaminants in the Great Lakes and elsewhere must be addressed through program redirection. Ministry of the Environment policy and program directions have, therefore, increasingly been focussed on the "contaminants issue". Initiatives are being taken both to further reduce contaminant emissions, and to enhance the protection of drinking water. At the same time maintenance of high levels of control at existing water and waste treatment facilities is being encouraged.

CONTROLLING THE DISCHARGE OF CONTAMINANTS

Efforts are now being directed at ensuring that performance of existing facilities is maintained at a high level, and that avenues for further reducing the discharge of identified hazardous contaminants are explored and the necessary control measures taken.

New Ministry initiatives include:

- Intensified characterization of industrial effluents including the use of biomonitoring techniques to identify hazardous contaminants

- Enforcement of a strict manifest system to ensure the safe transport and disposal of hazardous wastes at approved facilities

- Promotion of industrial plant modernization, better water management practices, substitution of process chemicals and treatment systems to further restrict contaminant inputs

- Assistance to municipalities in finding cost-effective solutions in the area of combined sewer overflows, stormwater management and the control of industrial inputs to municipal systems

- Continued research into improving treatment process efficiencies along with provision of technical support and training programs for treatment plant operators

- Streamlining monitoring programs to speed the assessment of compliance with effluent requirements

- Further controls on phosphorus inputs to the lower lakes as required under the new provision of the Great Lakes Water Quality Agreement

PROTECTING DRINKING WATER QUALITY

The Ministry is currently updating its policy on treatment requirements for waterworks to conform with the revised Ontario Drinking Water Objectives. Implementation of these policies may mean retrofitting of water works at some locations in the Province to meet the new requirements. Other initiatives include:

- Participation on the Federal/Provincial Working Group on Drinking Water Quality to revise and add to the "Guidelines for Drinking Water Quality - 1978"

- Addition of new substances to the interim priority list of Hazardous Contaminants in Drinking Water which is used, along with the Ontario Drinking Water Objectives, to evaluate acceptability of water supplies

- Continuing evaluation of improved treatment technology and the effects of this technology on contaminant removal and treatment product formation. Research is continuing in such areas as:

- o the use of ozonation and other chemicals as alternative disinfectants to chlorine;
- o procedures to optimize conventional water treatment processes for the highest removal of trace organics;
- o the use of granular activated carbon filtration as an add-on system (a pilot GAC facility has recently been installed at the Niagara Falls Waterworks).

- Expansion and updating of contaminant monitoring programs on drinking water. In 1984/85 thirty-five municipal waterworks (serving 70% of the Ontario population on municipal systems) will be examined, with monitoring for up to 110 parameters in the raw, treated and distributed water. This monitoring program will be continued and extended to other waterworks in future years and will incorporate new parameters as they emerge.

- Continued development of the best laboratory analytical methods for the quick and accurate determination of trace organics in drinking water. The Ministry's laboratory is widely recognized as a world class facility and leader in this area.

- Establishing protocols for the evaluation of alternate water treatment chemicals, coatings, linings and plastic pipes for use in contact with potable water.

CONCLUSION

Ontario is committed to the protection of the Great Lakes resource to meet the many and varied needs of its population. Progress is being made in reversing the degradation of these waters which had occurred through the middle of this century. While much remains to be done to safeguard the lakes for future generations, the Ministry of the Environment intends to meet this challenge.

FACTS

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METEOROLOGICAL ASPECTS OF AIR POLLUTION CONTROL AFS7-6/78

In our era of environmental awareness the public knows there are times when air pollution in the industrial zones of our large cities can reach levels which are hazardous to human health. And everyone has heard of smog.

However, not everyone knows why air pollution poses such a grave health hazard on some days and little or no hazard on others. The reasons are related to weather, one important factor affecting the amount of pollution present in the atmosphere.

There are actually a number of individual meteorological conditions -- factors of weather and climate -- that affect air pollution.

For example, wind, or the lack of it, affects movement and dispersion of pollutants. Rainfall washes many pollutants from the atmosphere. Humidity in the air has an important bearing on how pollutants affect buildings, vegetation, and human health. Sunshine produces photochemical changes in air pollutants which form smog.

And, of course, temperature affects the amount of fuel burned in houses, offices, and other commercial buildings, and this also has a bearing on the amount of pollutants emitted into the air.

Classes of Pollution Sources

Urban sources of pollution are divided into two classes:

low level emitters, including vehicles, combustion heating systems for houses and small commercial buildings, and privately owned incinerators.

high level emitters, including stacks at least 50 meters high serving municipal incinerators, industries, and central heating systems for commercial and institutional multi-building complexes.

Meteorological factors influence the ground or "living" level concentrations of pollutants from these two classes in different ways. In order to provide satisfactory forecasts of air pollution potential for a given area, the micrometeorology and topography of the area must be known. The locations and characteristics of principal sources of pollution must also be known.

Meteorological Factors Affecting Pollution Concentrations

Meteorological parameters having the most important influence on the transport and dispersion of pollutants in the atmosphere are wind direction and speed, turbulence, temperature, and stability.

Wind

Equatorial areas of the world receive more radiation than temperate or polar regions. As a result, there is constant heat transfer from equatorial to polar areas, to maintain heat balance. This thermal driving force is the main cause of atmospheric motion or wind over the earth.

In addition, the unequal heating of land masses versus oceans, the effects of mountain slopes facing the sun, and other topographical features also produce air at different temperatures, resulting in pressure differentials that produce winds.

Wind is air in motion in three dimensions. Only the horizontal component, however, is usually considered in terms of direction and speed.

Wind direction and speed have a direct effect on the dispersion and movement of pollutants.

Wind direction changes with altitude, normally veering a few degrees (clockwise) depending on the roughness of the terrain. It is always defined as the direction from which the wind is blowing. The "prevailing" wind is defined by the direction from which it is most frequently blowing in any given locality. Wind direction controls the direction of travel of pollutants.

Wind direction and its persistence is a very important factor in predicting the air pollution potential or susceptibility of an area in which the principal pollutant sources are high-stack emitters located close together. Wind direction is less important where low-level emitters cause most of the pollution.

Expected persistence of wind direction, often related to topographic features, must be considered when forecasting air pollution potential and selecting sites for plants with high-stack emitters. For example, where the principal pollution source is located on a lakeshore, high air pollution potential conditions can be expected when persistent on-shore winds are forecast. For a city such as Sarnia, which has most of its large industry located to the south, pollutant concentrations are high only when persistent southerly winds occur.

Topographical features such as valleys cause winds to persist in certain directions at much greater frequencies than others. Obviously, such localities should be avoided as sites for large industries.

Wind speed determines the travel time of pollutants from a source to a receptor. Wind speed also has a dilution effect. Pollutant concentrations downwind from a low-level source are inversely proportional to wind speed. That is, increasing wind speed results in decreasing concentrations. This dilution effect does not necessarily reduce concentrations of pollutants emitted by high-stack sources. In such cases, an increase in wind speed tends to drive the plume closer to the ground. There is a "critical wind speed" for each stack design at which the emissions will cause maximum concentrations of pollution at ground level.

Turbulence

Fluctuations in the wind are known as turbulence. These fluctuations can be both vertical and horizontal. These fluctuations are random motions that are responsible for the movement and diffusion of pollutants within the wind stream.

Two types of turbulence are known -- mechanical and thermal. Mechanical turbulence is caused by variations in and roughness of terrain and topography, including trees, shrubs, and buildings.

Thermal turbulence is the result of air near the earth's surface being heated, usually by the sun. Thermal eddies develop as the air, heating up at lower levels first, becomes less dense and rises. Thermal turbulence or vertical motions are at their maximum during the day and minimum during the night.

Temperature and Stability

The temperature of the lower region of the atmosphere, from the surface to two kilometers, can either decrease or increase with height. Whether the temperature increases or decreases with height is dependent upon the physical properties of the air, the underlying surface, and the amount of energy received from the sun. For example, during a sunny day, the air temperature over a city, with its many asphalt and concrete surfaces to capture solar heat, will decrease with height.

Atmospheric stability is related to the rate at which temperature changes with height. The degree of thermal turbulence is directly dependent upon the atmospheric stability.

Inversion

An inversion occurs when the temperature within a layer of air increases with height above the ground. An inversion inhibits the rise and dispersion of pollutants emitted into the atmosphere. When pollutants are emitted near the ground during an inversion, they remain and cause high concentrations to develop.

The reverse occurs when temperature decreases with height. The warmer air near to the ground rises and takes the pollutants emitted into it high into the atmosphere. When this happens, the concentrations of pollutants in the lower layers of the atmosphere decrease.

Three different inversion conditions are possible -- radiation, advection, and subsidence.

Radiation inversions are the most common. They are ground-based, and develop during clear nights when the air cools faster near the ground than aloft.

During the morning, as radiation from the sun warms the ground, the air nearest the ground warms first, and the inversion gradually breaks down from the lowest level upward. If a cloud cover moves in prior to sunrise, however, the inversion may continue during the day and high pollution levels will develop. The reason for this is that the clouds shield the earth and prevent it from warming up.

Advection inversions occur when warm air flows over a substantially cooler surface or cold air pushes under warmer air. Such inversions are especially common near oceans or large lakes during the summer months when warm land air flows over the cool lakes or cool lake air pushes onshore.

When the air near the ground warms sufficiently, it rises and is replaced by the cool lake air. This situation known as the lake breeze is common in spring and summer around the Great Lakes, especially around large cities such as Toronto and Hamilton. When the cool lake air replaces the warmer air, an inversion develops in the lower layers of the atmosphere which is especially conducive to the build-up of pollution from industry located near the shore.

Subsidence inversions are caused by the sinking motion of air usually associated with large high pressure areas. The descending motion of air results from the lateral spreading that occurs outwards from high pressure areas. It causes air to be compressed, thereby increasing its temperature and creating an inversion in a layer of air aloft.

Subsidence inversions become serious due to both the calm or light wind conditions accompanying high pressure areas and the tendency of high pressure areas to remain virtually stationary for long periods of time. An inversion aloft acts as a cap on pollution emissions, preventing them from dispersing into the high atmosphere.

Stability

Air stability is determined by the rate at which temperature decreases with height. A neutral condition exists when temperature decreases at the rate of approximately one degree Celsius per 100 meters. When temperature decreases at a greater rate, the air is considered unstable. Light winds and heating from the sun are necessary for this condition to occur. When winds are greater than six meters per second, the air will mix and any instability will tend to break down.

The impact of air stability on stack emissions is explained by the following series of diagrams showing stacks, smoke, and emission plumes.

Looping occurs when the atmosphere is highly unstable (sunny skies and light winds). There is generally good diffusion, although high concentrations may occur for very short time intervals when the plume strikes the ground. Cloudiness and strong winds prevent such unstable conditions from forming.

Coning occurs when the atmosphere is slightly unstable. Vertical mixing is not as intense as it is when looping occurs. The plume is cone-shaped. Ground level concentrations of pollution from high stacks can be predicted quite accurately at such times. H = effective stack height, h = height of the stack.

Fanning occurs when the atmosphere is very stable (during inversions). There is little vertical motion. The plume meanders horizontally with only slight vertical diffusion. Pollution concentrations in the plume are high. Ground concentrations of pollution vary according to stack height.

Lofting occurs when a plume is emitted above an inversion. The plume does not reach the ground.

Trapping occurs when there is an inversion aloft and an unstable layer of air beneath it. The plume it trapped below the inversion layer. High, ground-level pollutant concentrations accompany this condition. It occurs during persisting periods of high pressure or in advance of an approaching warm front.

Controlling Air Pollution

There are several methods by which air pollution can be controlled. For example, pollution can be controlled by reducing the emission rate or increasing the effective stack height. This is the height above ground at which a hot plume emitted from a chimney levels off. Reducing emissions is by far the preferred and most effective

method of control. Most small particles of fly ash, dust, and other pollutants can be removed through the use of efficient precipitators. Sulphur dioxide emissions can be reduced by burning lower sulphur content fuels.

Effective stack height can be increased by simply increasing the actual height of a chimney. It may also be increased by increasing both the exit gas velocity and temperature of the effluent, thus causing the plume to rise higher above the stack.

Forecasting air pollution potential so that control agencies can alert industry to carry out temporary abatement action is another technique used. The emissions are limited on a temporary basis during the period that inversions and light winds are occurring over the area of the industrial source. Meteorologists forecast these weather occurrences, advising industry in carrying out the temporary control measures, thus preventing a heavy build-up of pollution.

Ontario's Air Pollution Index and Alert System

The Ministry of the Environment operates more than 1,400 air quality and meteorological instruments in about 100 areas of Ontario as well as a fleet of three mobile testing vehicles.

An alert system, by which the Ministry may order the curtailment of emissions of pollutants by industry, is based on the Air Pollution Index levels which are recorded in several cities and meteorological forecasts issued by Ministry of Environment meteorologists. When the Index reaches 32 and weather forecasts indicate poor dispersion conditions are to continue for at least six hours, industries in the locality are asked to carry out voluntary curtailment of their emissions. Should the Index reach 50, sources may be ordered to cut back. At a level of 100, the Ministry can order all sources not essential to public health and safety to shut down until the weather condition changes producing good dispersion and a lowering of Air Pollution Index levels.

FACTS

Ministry of the Environment
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Hon. Jim Bradley
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Rod McLeod
Deputy Minister

SCIENTIFIC CRITERIA DOCUMENT FOR STANDARD DEVELOPMENT - POLYCHLORINATED DIBENZO-p-DIOXINS (PCDDS) AND POLYCHLORINATED DIBENZOFURANS (PCDFS)

BACKGROUND

A Ministry of the Environment staff committee was formed to develop the scientific basis for developing multi-media environmental standards. Medical advice was provided by the Ministry of Labour.

The Ontario Scientific Advisory Committee on Dioxins and Furans (OSAC) was appointed to provide technical direction and peer review. The Committee was comprised of world-renowned experts:

- Dr. E. Y. Spencer from the University of Western Ontario chaired the Committee
- Dr. O. Hutzinger, University of Bayreuth, Germany
- Dr. G. L. Plaa, University de Montreal
- Dr. S. Safe, Texas A and M University.

The culmination was the production of the Scientific Criteria Document comprising 536 pages reviewing:

- toxicology of this group of compounds
- their sources
- possible exposure pathways in Ontario.

MAJOR CONCLUSIONS AND RECOMMENDATIONS

What are PCDDs and PCDFs

The terms dioxin and furans refer to families of 75 related chemical compounds known as polychlorinated dibenzo-p-dioxins (PCDDs) and 135 related chemical compounds known as polychlorinated dibenzofurans (PCDFs) respectively.

These two families of compounds possess similar chemical structures, patterns of toxic and biological responses and may share a common mechanism of action at the cellular level. Therefore, they are being dealt with as a group for the purposes of development of environmental standards.

The most toxic forms of PCDDs and PCDFs are those containing 4-6 chlorine atoms, with four of the chlorine atoms at the lateral positions, i.e., 2, 3, 7 and 8.

The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) is the most toxic of all the PCDDs and PCDFs.

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These compounds are not intentionally made for any purpose; they are unavoidable by-products created in the manufacture of other chemicals such as some pesticides, or as a result of incomplete combustion of mixtures containing chlorine atoms and organic compounds.

Occurrence in Ontario

In Ontario, there is no current chemical manufacturing of 2,4,5-trichlorophenol, nor formulation of 2,4,5-T and 2,4-D herbicides or pentachlorophenol or hexachlorophenol chemicals with which PCDD and PCDF contamination has been associated.

Current sources of PCDDs and PCDFs in the Ontario environment are from incineration processes or the use of products which contain trace amounts of PCDDs and PCDFs.

The PCDDs and PCDFs from these sources are usually complex mixtures. The 2,3,7,8-T_4CDD isomer is generally only a small per cent of the total PCDDs and PCDFs present. This is in contrast to the problem in the United States where because of extensive chemical manufacturing and waste disposal, 2,3,7,8-T_4CDD is a serious environmental contaminant.

Analyses carried out by Health and Welfare Canada on PCDD and PCDF residues in tissues of deceased and living persons, indicate body burdens of some PCDD and PCDF isomers in the majority of the samples analyzed. These results suggest that PCDDs and PCDFs are ubiquitous at low levels in the Ontario environment.

Based on extensive reviews of the literature on the toxicology of PCDDs and PCDFs, the following conclusions and recommendations have been reached:

(a) Sources and Exposure

The document reviews extensively the current sources of PCDDs and PCDFs in Ontario based firstly upon analytical data from Ontario and where this is absent, upon extrapolation from other Canadian or international data. In order of decreasing contribution to the Ontario environment, the sources have been identified as:

i) combustion sources including municipal refuse and sewage sludge incineration;

ii) use of chemical products such as chlorinated phenols; and,

iii) other sources such as transboundary water and air contamination, chemical wastes, commercial and domestic wastes, polychlorinated biphenyls (PCBs) and sewage.

Based on preliminary exposure assessment the major routes of exposure in order of decreasing contribution appear to be;

i) ambient air in the vicinity of incineration sources;

ii) diet, mainly some sport fish from Lake Ontario;

iii) atmospheric PCDDs/PCDFs deposited on soil, mainly to children; and,

iv) surface water - it should be noted that no PCCDs or PCDFs have been found in samples of finished drinking water in Ontario.

(b) PCDD and PCDF Toxic Equivalent Factors

The report recommends the use of numerical conversion factors to convert the toxic concentrations of other PCDD and PCDF congeners to equivalent concentrations of 2,3,7,8-T_4CDD which would exhibit similar toxicity.

2,3,7,8-T_4CDD comprises a very small percentage of PCDD and PCDF isomers found in Ontario environmental samples.

Ontario environmental samples contain complex mixtures of PCDD and PCDF isomers.

There is only sufficient toxicological data for 2,3,7,8-T_4CDD (the most toxic and most studied isomer) for standard development.

The time required to accumulate suitable toxicological data on other isomers may run into decades. The apparent toxic potency relationships of other PCDDs and PCDFs to 2,3,7,8-T_4CDD is proposed.

(c) Recommended Maximum Allowable Daily Intake

Review of extensive toxicological data indicates that 2,3,7,8-T_4CDD is not a classical mutagen and appears to cause tumours in rodents by an indirect mechanism. The staff committee and the Ontario Scientific Advisory Committee concluded that a threshold exists for tumour incidence and consequently 2,3,7,8-T_4CDD will not cause cancer in humans at levels below the threshold found in animal studies.

Based on reliable chronic animal studies and extensive but inconclusive human epidemiological data, it is recommended that a threshold-safety factor approach be used to develop a maximum allowable daily intake.

The proposed standard recommends an umbrella maximum allowable daily intake of 2,3,7,8-T_4CDD or its toxic equivalent from all exposure pathways based on no observable effect level from rodent cancer bioassays and an explicit safety factor of 100.

The recommended maximum allowable daily intake for 2,3,7,8-tetra-chlorodibenzo-p-dioxin (2,3,7,8-T_4CDD) or its toxic equivalent of PCDDs and PCDFs is 10 picograms/kilogram of body weight/day for humans.

Copies of the document are available from:

Intergovernmental Relations
and Hazardous Contaminants Branch
Ministry of the Environment
135 St. Clair Ave. W.,
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FACTS

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Hon. Andrew S. Brandt
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ONTARIO MINISTRY OF THE ENVIRONMENT ACHIEVEMENTS AND FUTURE DIRECTIONS IN GREAT LAKES CLEAN-UP AND DRINKING WATER PROTECTION

INTRODUCTION

The Great Lakes are vital to the citizens of Ontario and are an important resource to all of Canada. More than six million Canadians live in the Great Lakes basin. Add this to the U.S. population in the basin, and there are nearly 37 million people dependent on this waterway as a major source of water supply, employment and recreation.

Recognizing their shared responsibility in the use and protection of the lakes, Canada and the United States created the International Joint Commission in 1909. Between 1912 and 1969, the IJC conducted several studies of Great Lakes pollution leading to the signing of the Great Lakes Water Quality Agreement of 1972. This marked the beginning of a major international clean-up of Lakes Erie and Ontario, the initiation of studies on pollution from land use activities and the introduction of new initiatives in toxic substances management.

Ontario has long been at the forefront in the assault on Great Lakes pollution and in the development and protection of drinking water supplies. Since 1972, the Ministry of the Environment and, for 15 years prior to that, the Ontario Water Resources Commission have been instrumental in the funding, construction and operation of water and sewage treatment facilities, in the introduction and enforcement of environmental regulations, in the continued development and refinement of water quality objectives and in the assessment and resolution of water use conflict.

WATER QUALITY AND QUANTITY MANAGEMENT

The water quality management goal of the Ministry of the Environment is: "To ensure that the surface waters of the Province are of a quality which is satisfactory for aquatic life and recreation". The Provincial Water Quality Objectives (PWQO), a set of criteria designed to protect these uses, are published in the booklet "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment". The Ministry achieves this goal through programs and actions provided for in the Ontario Water Resources Act, the Environmental Protection Act and other legislation. Ministry approval of waste discharges and of treatment works is required under these statutes.

On the water quantity side, the Ministry of the Environment goals are directed toward the fair sharing of the available supply to protect both withdrawal and in-place uses of surface water, and to ensure a fair sharing and conservation of ground water.

The permit to take water program, authorized under Ontario Water Resources Act, is the primary water quantity management tool employed by the Ministry of the Environment. All water users withdrawing or impounding over 50,000 litres on any one day of the year are required to obtain a Permit. There are currently approximately 6000 Permits in force authorizing the withdrawal or impoundment of 14.4 billion litres per day.

The Provincial Water Quality Objectives ensure protection of other uses including potable water supplies. Drinking water quality is further protected through requirements for additional purification and disinfection of these supplies prior to delivery to the consumer.

CONTROLLING MUNICIPAL SEWAGE

PROGRAMS:

With the creation of the OWRC in 1956, Ontario launched a massive program to provide basic sewage services throughout the province. The program has continued under the direction of the Ministry of the Environment since 1972 and construction of new plants in Ontario is now virtually complete. Provision of these facilities has been instrumental in protecting the public from the outbreak of waterborne disease. Minor plant upgrading is ongoing and emphasis has switched to ensure existing plants meet Ministry effluent requirements through good operations and maintenance.

There are presently 308 sewage treatment plants in the Ontario portion of the Great Lakes Basin. With an approximate capacity of 5.2 million cubic metres per day these facilities serve 6.4 million people. This represents a 36% increase from the 4.7 million people serviced in 1970. Secondary treatment or better is now provided at 283 plants serving 88% of the total capacity. Fifteen years ago, only 77% of plant capacity received this level of treatment. Phosphorus removal facilities are installed at 230 plants representing 97% of the overall capacity. Total phosphorus inputs from Ontario plants have been reduced by 77% or 5400 tonnes since 1970. This constitutes a major step in the battle against the nutrient enrichment problem and resultant algal "blooms" which had plagued Lakes Erie and Ontario.

The total investment in the construction of municipal sewage collection and treatment facilities in Ontario has been in excess of $3.3 billion since 1968. Of this an estimated 80% or $2.7 billion was devoted to the Great Lakes Basin.

MUNICIPAL PHOSPHORUS LOADING REDUCTIONS

	1968	1983	Change
POPULATION SERVED	4.7 Million	6.4 Million	+36%
PHOSPHORUS LOAD TONNES/YR	7000	1600	-77%
AVERAGE EFFLUENT CONCENTRATION MG/L	6	1.0	-83%

ENVIRONMENTAL IMPROVEMENTS:

Accomplishments over the past 15 years in upgrading sewage treatment facilities throughout the Great Lakes basin have resulted in significant environmental improvements.
Recent investigations by the Ministry and other agencies show that:

- Shoreline bacterial levels adjacent to Ontario towns and cities around the Great Lakes are greatly reduced from levels observed in the 60's and in most cases comply with objectives.

- The median total phosphorus concentration in open waters of Lake Ontario has declined to 13.5 ug/L, the lowest reported in the last 13 years. Improvements are also reflected in nearshore areas such as Hamilton Harbour, Toronto Harbour and Bay of Quinte where phosphorus levels have declined by up to 50% over the same period.

- Improving conditions in Lake Ontario are also indicated by a shift toward healthier (less enriched) phytoplankton (algae) species composition.

- Measurable reductions in oxygen depletion problems have taken place in Toronto and Hamilton harbours and in the Bay of Quinte.

- Local water treatment plant efficiencies have improved because of reduced algal growth in the Bay of Quinte.

- Total phosphorus concentrations have declined 35% in western Lake Erie since 1974.

- Nuisance growths and shoreline accumulation of cladophora (algae) in eastern Lake Erie are down significantly.

- There is some evidence of a reduction in the severity of oxygen depletion in the deep portions of the central basin of Lake Erie.

- In Lake Huron and Georgian Bay, the total phosphorus concentrations (5 ug/L) have remained unchanged since 1971. Thus, the non-degradation objective of the 1978 Great Lakes Water Quality Agreement is being met. Phosphorus levels in some embayment areas of Georgian Bay remain higher than open water levels due to nearby municipal inputs and limited exchange with the open water. They have, however, been stable since 1973.

- In Lake Superior, the average total phosphorus level has stayed around 5 ug/L, providing a high level of protection against aesthetic deterioration and satisfying the non-degradation objective.

CONTROLLING INDUSTRIAL POLLUTION

PROGRAMS:

MOE initiatives have demonstrated that environmental improvement and industrial progress can be compatible. Significant reductions in waste discharges have occurred over the past fifteen years in spite of overall production increases by industry and recurring recessionary factors in the economy. This has been achieved through the construction of treatment facilities, through process changes and through replacement of older industrial production facilities with new "environmentally clean" plants incorporating the latest water recycling, material conservation and energy saving measures. Following are highlights of achievements made by three major industrial sectors from 1967 to 1981/82, at an estimated pollution control expenditure of $500 million. Similar overall progress and expenditures have been made in the other industrial sectors such as petrochemical, metal finishing and fabrication, and food processing.

PETROLEUM REFINERIES

Over the past 15 years, two new refineries have been constructed (start-up in 1977) incorporating state-of-the-art environmental controls, two older refineries have closed, and the other refineries have installed secondary (biological), and in some cases tertiary (carbon filtration) wastewater treatment systems. Together, these activities have resulted in large reductions in the discharges of oxygen demanding wastes, suspended solids, oil and grease, phenolics and ammonia even though production capacity has risen significantly over the period.

PETROLEUM REFINERIES

	1967	1981	Change
NUMBER OF REFINERIES	7	8	+ 1
PRODUCTION 1000 BBLS/DAY	403	633	+ 57%
SUSPENDED SOLIDS KG/DAY	13300 (1972-73)	2170	- 84%
OIL & GREASE KG/DAY	4100	514	- 88%
AMMONIA - N KG/DAY	2320	313	- 87%
PHENOLICS KG/DAY	102	10.2	- 90%

STEEL

There are 3 primary steel producers in Ontario, two in Hamilton and one at Sault Ste Marie. Process improvements, better water management practices and waste treatment facilities have brought about significant reductions in the discharge of suspended solids, oil and grease, ammonia, phenolics and cyanide. The Ministry is requiring additional improvements to be made with programs at the Sault mill to be completed by 1990.

STEEL

	1967	1982	Change
NUMBER OF MILLS	3	3	
PRODUCTION TONNES/YR	8 Million	10.7 Million	+ 34%
SUSPENDED SOLIDS KG/DAY	126000	35500	- 72%
AMMONIA - N KG/DAY	23880	8280	- 65%
OIL & GREASE KG/DAY	30000	3380	- 89%
PHENOLICS KG/DAY	2730	358	- 87%
CYANIDE KG/DAY	2370	338	- 86%

PULP AND PAPER

Substantial decreases in loadings of oxygen-demanding substances and suspended solids, along with reduced effluent toxicity to fish, have resulted from a combination of mill modernization, better water management practices, process changes and installation of waste treatment facilities. Existing MOE control orders require further improvements to achieve compliance with the Federal Pulp and Paper Effluent Regulations by 1987.

PULP AND PAPER

	1967	1982	Change
NUMBER OF MILLS	22	22	
PRODUCTION TONNES/DAY	7350	8540	+ 16%
BOD_5* TONNES/DAY	610	315	- 48%
SUSPENDED SOLIDS TONNES/DAY	375	82	- 78%

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*a measure of oxygen - demanding substances

ENVIRONMENTAL IMPROVEMENTS:

Achievements in reducing waste loads from these and other industrial sources along with controls on the manufacture and use of a number of chemical compounds in both Ontario and the Great Lakes States have resulted in corresponding improvements in the Great Lakes environment. Notable among the changes observed by the Ministry and others are:

- Declining levels of PCB's in sport fish from Lake Ontario, Lake Erie, Lake Huron, Georgian Bay and Lake Superior

- Declining inputs of PCBs, mirex, DDT, chlorinated benzenes and mercury from the Niagara River to Lake Ontario since the mid 1970's as evidenced by sediment and fish data

- Significant reductions in levels of phenolics, bacteria and phosphorus in the Niagara River

- Improvements in species diversity and numbers of bottom dwelling organisms which are important to the fish community along the Ontario shoreline of both the St. Clair and Detroit Rivers as well as in the western basin of Lake Erie

- Achievement of the water quality objective for phenolic substances and overall reduction in the zone of influence of petroleum refinery and petrochemical plant discharges on the St. Clair River

- Elimination or reduction of aesthetic degradation, i.e. oil films, discoloration, and floating solids, adjacent to industrial plants

- Reductions in mercury concentrations in fish to levels where commercial catches were resumed in the western basin of Lake Erie in 1975 and for certain species from Lake St. Clair in 1980

- Declining phenol, cyanide and ammonia levels in the St. Marys River

- Reductions in the zone of influence on water, sediment and biota of pulp mill discharges at all mill locations on Lake Superior

DRINKING WATER SUPPLY AND PROTECTION

As a result of major program initiatives by the OWRC and MOE most of the population in the Ontario Great Lakes basin is now served by communal water treatment and supply systems. Extension of service to the few remaining serviceable communities is continuing. Emphasis has, therefore, shifted to the optimization of existing plant operations and the upgrading of sub-standard facilities.

All water supply systems in Ontario are required to have acceptable treatment processes which ensure that the potable water produced meets the intent and limits set out in the Ontario Drinking Water Objectives. For water works which utilize surface water as a source of raw water, the standard treatment processes consist of chemical coagulation-flocculation, filtration and disinfection. For water works which utilize ground water, the standard treatment consists of disinfection.

There are presently 428 water treatment plants in the basin with an approximate capacity of 9.1 million cubic metres per day, sufficient to serve a population of 7.4 million people. Eighty-eight percent of the population obtain their drinking water from surface water supplies. Total investment in the construction of municipal water treatment and distribution facilities in Ontario has been in excess of $1.5 billion since 1968. Of this, an estimated 80% or $1.2 billion was directed to Great Lakes basin communities.

Beyond these statistics, the real benefits of the provincial water supply and treatment initiatives have been maximum public protection from the transmission of waterborne disease and the assured availability of a high quality supply to meet all household and community needs.

FUTURE DIRECTIONS

The large scale programs of the 60s and 70s for basic water and sewage service to serviceable communities in Ontario are now virtually complete. Substantial progress has also been made in reducing conventional pollutant loadings to the Great Lakes from industry. While these major activities are winding down, heightened public awareness and concern about potentially hazardous contaminants in the Great Lakes and elsewhere must be addressed through program redirection. Ministry of the Environment policy and program directions have, therefore, increasingly been focussed on the "contaminants issue". Initiatives are being taken both to further reduce contaminant emissions, and to enhance the protection of drinking water. At the same time maintenance of high levels of control at existing water and waste treatment facilities is being encouraged.

CONTROLLING THE DISCHARGE OF CONTAMINANTS

Efforts are now being directed at ensuring that performance of existing facilities is maintained at a high level, and that avenues for further reducing the discharge of identified hazardous contaminants are explored and the necessary control measures taken.

New Ministry initiatives include:

- Intensified characterization of industrial effluents including the use of biomonitoring techniques to identify hazardous contaminants

- Enforcement of a strict manifest system to ensure the safe transport and disposal of hazardous wastes at approved facilities

- Promotion of industrial plant modernization, better water management practices, substitution of process chemicals and treatment systems to further restrict contaminant inputs

- Assistance to municipalities in finding cost-effective solutions in the area of combined sewer overflows, stormwater management and the control of industrial inputs to municipal systems

- Continued research into improving treatment process efficiencies along with provision of technical support and training programs for treatment plant operators

- Streamlining monitoring programs to speed the assessment of compliance with effluent requirements

- Further controls on phosphorus inputs to the lower lakes as required under the new provision of the Great Lakes Water Quality Agreement

PROTECTING DRINKING WATER QUALITY

The Ministry is currently updating its policy on treatment requirements for waterworks to conform with the revised Ontario Drinking Water Objectives. Implementation of these policies may mean retrofitting of water works at some locations in the Province to meet the new requirements. Other initiatives include:

- Participation on the Federal/Provincial Working Group on Drinking Water Quality to revise and add to the "Guidelines for Drinking Water Quality - 1978"

- Addition of new substances to the interim priority list of Hazardous Contaminants in Drinking Water which is used, along with the Ontario Drinking Water Objectives, to evaluate acceptability of water supplies

- Continuing evaluation of improved treatment technology and the effects of this technology on contaminant removal and treatment product formation. Research is continuing in such areas as:

- o the use of ozonation and other chemicals as alternative disinfectants to chlorine;
- o procedures to optimize conventional water treatment processes for the highest removal of trace organics;
- o the use of granular activated carbon filtration as an add-on system (a pilot GAC facility has recently been installed at the Niagara Falls Waterworks).

- Expansion and updating of contaminant monitoring programs on drinking water. In 1984/85 thirty-five municipal waterworks (serving 70% of the Ontario population on municipal systems) will be examined, with monitoring for up to 110 parameters in the raw, treated and distributed water. This monitoring program will be continued and extended to other waterworks in future years and will incorporate new parameters as they emerge.

- Continued development of the best laboratory analytical methods for the quick and accurate determination of trace organics in drinking water. The Ministry's laboratory is widely recognized as a world class facility and leader in this area.

- Establishing protocols for the evaluation of alternate water treatment chemicals, coatings, linings and plastic pipes for use in contact with potable water.

CONCLUSION

Ontario is committed to the protection of the Great Lakes resource to meet the many and varied needs of its population. Progress is being made in reversing the degradation of these waters which had occurred through the middle of this century. While much remains to be done to safeguard the lakes for future generations, the Ministry of the Environment intends to meet this challenge.

FACTS

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COUNTDOWN ACID RAIN

ACIDIFICATION – WARNING SIGNS

Throughout Ontario and much of Eastern Canada, thousands of lakes are struggling to survive the effects of acid rain, and many are losing the battle. Some have already acidified and others are reaching a critical state. In limestone terrain the lakes maintain their equilibrium through the protective chemistry of the surrounding rocks and soils. In the long term, lakes in these resilient areas will be able to withstand continuing acid precipitation. In the vast Canadian Shield region, however, the terrain offers its lakes no alkaline buffering, leaving them vulnerable to death by acid rain.

How Does a Lake Decline?

The speed at which a lake acidifies is largely determined by its natural chemistry and its geography – the exposure of the area to acid deposition, and the individual characteristics and sensitivity of the local geology and vegetation.

Each lake supports a unique ecosystem, but fundamentally, the process of acidity-caused degeneration is the same for them all. One by one, organisms in the aquatic food web succumb to the effects of increasing acidity. As the system breaks down, it loses its ability to support diverse life forms. Eventually it becomes unable to sustain anything other than a few highly resistant species, such as slimy algae.

This has already happened to some of our lakes and will become a reality for many more unless strong measures are taken to protect them soon. In Ontario, the Peterson government has introduced a program called *Countdown Acid Rain*, which is making major reductions in the province's sulphur dioxide emissions. However, U.S. sources are responsible for 50% of the acid rain that falls in Ontario and without the implementation of abatement measures by our neighbours south of the border, our acid sensitive lakes have little chance of survival.

Post Mortem

Scientists have not monitored the effects of acid rain for long enough to be able to predict exactly when a lake will acidify. However, numerous studies have been carried out in recent years and some conclusive evidence has emerged. We now have a fairly clear picture of what happens to a lake as it declines.

It is not a pretty picture. If we do not succeed in controlling acid rain, the history of many more of our lakes might read as follows:

Take an average lake of about 100 hectares, with a corresponding watershed of about ten times this area. It is surrounded by a pine and maple forest. The bedrock is typical Canadian Shield granite and the soil a thin organic layer on sand or gravel. The water is roughly 30 meters in depth and at the beginning of this "history" had a pH of 6.8.*

A number of years ago, the lake supported thriving plant and animal communities. There were plenty of fish – lake trout, yellow perch,

white suckers and a variety of forage fish, such as common shiners and lake chub. Crayfish, clams and snails crawled on the lake bottom, water beetles scooted across the surface and dragonflies and mayflies hovered above it. Frogs crouched on lily pads waiting for unwary insects, snakes slithered in the mud and turtles sunned themselves on the rocks around the shore.

The aquatic creatures provided a rich diet for many birds. Kingfishers and a pair of loons nested on the lake and blue herons were seen from time to time. Various mammals, such as a family of mink, made their homes along the shoreline and beavers had built a large dam on the outlet stream. Moose came to feed on the waterlilies and otters visited occasionally to hunt for fish.

As North American industrialization grew, the environment around the lake received increasing punishment from acid rain. Upwind, nickel and copper smelters and several coal-fired generating stations were spewing tons of sulphur dioxide into the air every year. Growing cities jammed with cars, trucks and buses added a smog of nitrous oxides. Small industries contributed their smoke, and prevailing winds carried this pollution over the lakes and forests. In the atmosphere the emissions were transformed into acid, bringing the pH of the precipitation down until it was rarely higher than 4.2.

For a while the natural alkalinity of the lake and its surrounding soils counteracted

pH Greater than 5.0

the acid rain, but the granite bedrock contained very little of the calcium carbonate needed to neutralize the increasing acidity. Within a few years the normal slight rise and fall in the pH of the lake had begun to tilt to greater and greater extremes of acidity. The sudden thawing of acid snow in the spring could bring the pH of the surface waters plunging to 4.0, and throughout the year any unusually heavy rain could create a similar pulse of acidity.

It is not long before the lake's inhabitants began to suffer from the effects of these acid shocks. One spring the eggs of leopard frogs spawning in pools of meltwater failed to hatch, and in the inlet streams a new generation of white suckers died as soon as they emerged as fry.

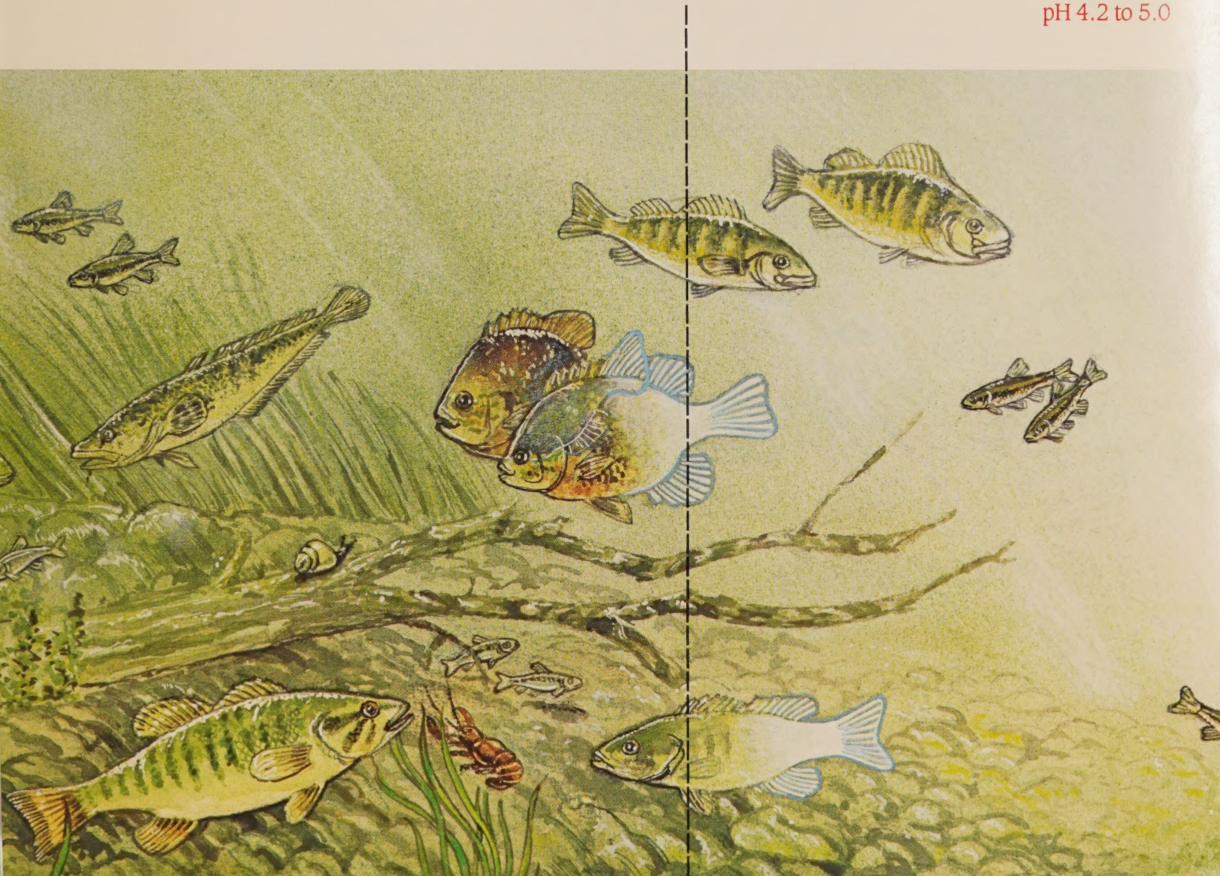
In the next spring melt, the young of the johnny darter were lost too. The lake was unable to recover fully from the constant acid loading of heavy rains during the summer, and its overall pH began to decrease.

When the lake pH reached 5.6 the opossum shrimp were gone and their predators, young lake trout, were becoming emaciated.

During the next few years the changing chemistry of the water affected not only vulnerable eggs and fry, but also the adult aquatic creatures. Aluminum, leached from the soil by acid run-off, was reaching poisonous levels in the lake. Stressed by this and the low pH, many of the lake's inhabitants failed to reproduce.

Because of the water's acidity the crayfish found it difficult to harden their exoskeletons.

pH 4.2 to 5.0



They became more vulnerable to parasites and the females ceased to be able to carry their eggs protectively, leaving them to be eaten by the remaining fish.

While the falling pH was taking its toll on the animal population, several unpleasant species of plant life had begun to proliferate. Slimy algal "blooms" appeared in the water with increasing frequency and another variety of algae gave the lake a garbage dump odour.

One year a rapid spring melt produced an acid shock that brought the pH of the lake down to 5.3 and several species of fish, such as the common shiner, disappeared completely.

Other species, such as the lake trout and burbot, had failed to reproduce for several years, so the remaining fish population consisted largely of older generations.

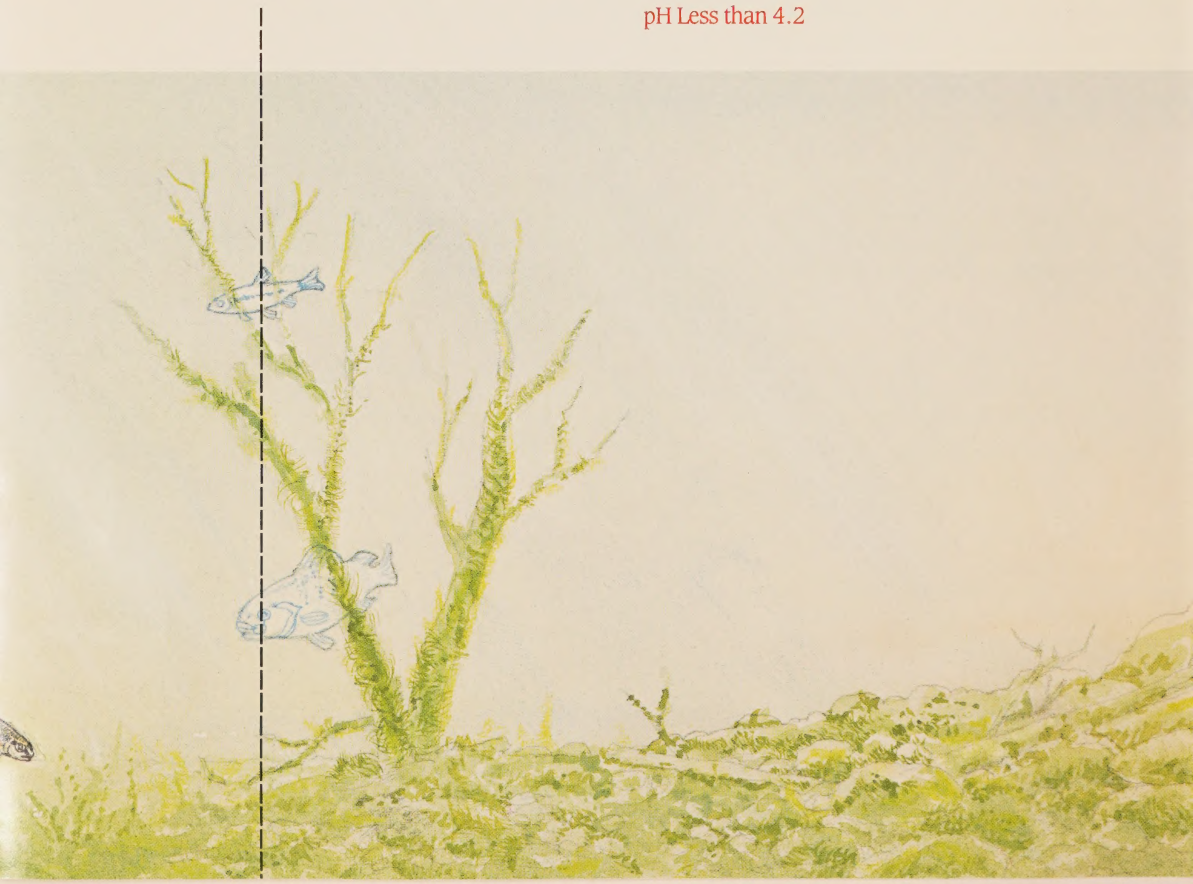
Within a few years there were no frogs in the lake. When the pH dropped below 5.5 the birds, accustomed to finding plenty of snails in the shallows, discovered that this food source was scarce too.

When the overall pH of the lake dropped below 5.0, the only fish left were acid resistant species such as yellow perch and lake chub. All of the crayfish and clams had gone, closely followed by the mayflies and dragonflies.

The loons, the mink and many birds, faced with starvation, moved on in search of lakes that could still maintain a food supply for them.

Eventually, the alkalinity of the entire watershed was exhausted and when the lake's pH fell to about 4.7, it ceased to fluctuate so wildly and

pH Less than 4.2



simply decreased at a steady rate. There were no birds, no fish, no amphibians and no mammals.

Before long, the lake had reached a pH of 4.3, almost as low as the acidity of the precipitation itself. It still looked beautiful, but the healthy blue-green clarity of the water belied the fact that most of its inhabitants had gone. Only a few undesirable life forms suited to acid conditions remained. A complex and abundant ecosystem had become an acid reservoir. The lake was finished.

Warning Signs

The above "history" is compiled from data from a broad range of lake studies. There is no shortage of real life examples to warn that, while our lakes may be degenerating at different rates, they are all heading in the same direction.

Algae

As lakes acidify the diversity of species declines. Giant balls of slimy filamentous algae, *Mougeotia*, *Zygogonium*, and *Zygnema*, which thrive in acid conditions, appear more frequently as other species dies out. The marked change in community composition has a corresponding effect on the food chain.

Other undesirable species are favored by low pH. Experiments on the alga *Chrysochromulina breviturrita* show that blooms will occur creating noxious lakewide odours, even in moderately acid lakes.

Crustaceans

Opossum shrimp (*Mysis relicta*) become extinct at about pH 5.8. Amphipods (*Hyalella azteca*) are seldom observed below pH 5.6.

Three common species of crayfish *Orconectes virilis, O. propinquus* and *O. rusticus* are extremely sensitive to acidity. Testing showed that they developed a variety of stresses below pH 5.7. Calcium uptake was inhibited, delaying hardening of the exoskeleton. Parasitism became a problem, egg mortality increased and many of the young failed to mature.

Molluscs

In acid conditions, the common and usually abundant snail *Amnicola limnosa* displayed a significant decrease in growth and became scarce. In Heeney Lake total developmental failure occurred at pH 5.0 and apparent reproductive failure was also observed.

Insects

Data suggest that a number of genera of mayflies and stoneflies are sensitive to low pH. Their eggs are laid and hatch in the water, and under acid conditions few young will survive beyond the larva stage.

Amphibians

Although terrestrial as adults, amphibians are aquatic creatures at the earliest and most vulnerable stages of their lives, so the most direct impact of acidity is on their eggs and larvae. Since many amphibians spawn in pools of meltwater, the spring acid shock will often wipe out these species long before the lake itself reaches a low pH. Some species, such as the bullfrog (*Bufo americanus*) will suffer 100% mortality of eggs at pH 4.1 and others such as the spotted salamander (*Ambystoma maculatum*) showed a 65% loss of embryos in ponds with a pH of 5.0.

Fish

During the 1960s, in the lakes of the La Cloche Mountain region of Ontario, a variety of fish species disappeared. Species such as trout, bass and shiners died out very quickly as the lakes acidified, while hardier fish such as yellow perch and lake chub survived longer.

Fish populations disappear when reproductive failure occurs for a number of successive years. Either the eggs fail to hatch, or the vulnerable fry die as soon as they emerge. Few fish can reproduce at pH values below 5.0.

The loss of fry also removes a valuable food source from the ecosystem, which affects a variety of predators, including other fish.

Some fish develop skeletal deformities in acid conditions. Scientists hypothesize that this is because the acid water forces them to draw calcium from their own bones in an attempt to maintain normal blood chemistry.

Wildlife

A vast number of birds and small mammals are dependent upon aquatic food sources, so when a species disappears an entire food chain is disrupted.

Elevated levels of mercury, cadmium and lead are suspected in acidifying lakes and may, therefore be present in the flesh of molluscs, crustaceans and the fish and birds that feed on them. Scientists are exploring the possibility that acidification also increases aquatic creatures' uptake of metals.

These highly toxic metals accumulate as they are passed up food chains. Combined with the low pH, this can have a severe effect on many species.

Hope for Recovery?

If acid deposition rates are reduced, there is evidence that lakes can recover from acidification – up to a point. On a local scale, in the Sudbury area of northern Ontario, (where smelters had long been one of North America's major point sources of pollution), recent reductions in industrial emissions have made a noticeable difference. Lakes in close proximity to the smelters were seriously acidified, but since about 1980 there have been substantial signs of improvement.

In some lakes the pH has risen by as much as 1.5 units, phytoplankton and insects have returned and fish that had ceased to breed are once more producing young.

Other lakes are too far gone in that the fish populations and other inhabitants such as crayfish and molluscs have died out completely. The aquatic creatures that can move from one lake to another may return eventually, but the natural recovery of the most seriously affected lakes will only be partial.

The recovery can be assisted artificially, for example by restocking the lake with individual species; but in reality there is only so much that can be done to recreate such a complex and carefully balanced system.

Many large food chains originate within the aquatic level of the ecosystem and the loss of life in the essential area cannot fail to have a major impact on the environment as a whole.

The Broader Hope

Current acid loadings across eastern North America are too heavy for many lakes in Ontario's Muskoka and Haliburton regions, New York's Adirondacks and other vulnerable areas. The remedy for acid rain damage is the extensive and methodical pollution control program set out in Ontario's Countdown on Acid Rain matched by equally strong cutbacks in other provinces and the United States.

Of course the aquatic element is only one of the aspects of the environment that is suffering from the effects of acid rain. For our environment – and for most of our lakes – it is not too late to do something to stop the damage and allow recovery, but action is needed, and it is needed now.

* A pH scale measures the acidity or alkalinity of a solution. It ranges from 0 to 14, and a pH of 7 is neutral. The lower the pH the greater the acidity. Because the pH scale is logarithmic, a decrease of one pH unit means a ten-fold increase in acidity. Normal "clean" rain is naturally slightly acidic with a pH of 5.6.